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STUDY OF STABILITY PROBLEMS AND HAZARD EVALUATION IN THE MISSOURI PORTION OF THE TRI-STATE MINING AREA

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FOREWORD

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STUDY OF STABILITY PROBLEMS AND HAZARD EVALUATION IN THE MISSOURI PORTION OF THE TRI-STATE MINING AREA

by

Michael C. McFarland¹ and James C. Brown Jr.²

ABSTRACT

A two-year investigation has disclosed 469 hazardous sites resulting from past zinc-lead mining in the vicinity of Joplin, Missouri. Aerial-photo analysis, fieldwork, library research, and personal interviews were conducted to locate and describe the abandoned mining areas and their associated hazards. Open shafts, subsidence pits, and other mine-related dangers exist in areas easily accessible to the public. Accidents involving humans and livestock have been reported. Some recent damage to buildings and roads can be attributed to the collapse of underground mine workings. A few landowners have employed successful methods of safeguarding dangerous sites. In addition, some surface reclamation has been effected by gradual removal and use of mine and mill waste-rock, with subsequent leveling and reuse of the land. Other than backfilling shafts, nothing has been done to stabilize undermined areas. A continuing problem is indicated. Under present laws, most government reclamation funds are designated for coal-mined lands. A comprehensive program of hazard control and monitoring for the entire study area is warranted.

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INTRODUCTION

Purpose of Study

From 1848-1970, the Tri-State Mining District of Missouri, Kansas, and Oklahoma produced zinc and lead concentrates worth over two billion dollars (4, p. 401)³. The ore production from this district, which ranks as one of the world's largest, exceeds 500 million metric rock tons. Zinc ores were about six times as abundant as those of lead. The removal of the mineralized beds created large underground voids, some with very thin, weak ceilings. The stripping of ore-bearing support pillars at the end of mining activity led to increased roof instability. Following shutdown of mining operations, the underground workings became flooded.

The abandoned mines now pose several types of safety and environmental hazards to area residents. Subsidence, or sinking of the ground surface, has resulted from roof collapse above the mine workings. There are numerous open shafts and water-filled pits throughout the region. Local surface water quality has been affected by rain water runoff and seepage from mine waste piles and by artesian flow of polluted mine water from open shafts. These problems have been recognized for some time, but there has been no concentrated effort to correct them.

In 1979, Congressmen Bob Whittaker, Kansas; Mike Synar, Oklahoma; and Gene Taylor, Missouri, sought to appropriate federal money to study the situation in their respective states. The Bureau of Mines recommended a survey of existing conditions in order to determine the best methods of protecting the public from hazards. In 1980, federal funds were budgeted for a two-year cooperative project between the Bureau of Mines and the geological surveys of the three states involved - Kansas, Oklahoma, and Missouri. This report summarizes the investigations and results of the Missouri part of the study.

Various metric and English units of measurement are used throughout this report. For the convenience of the reader, applicable conversion factors and unit abbreviations are listed in table 1.

Objectives and Scope of Work

The objectives of this study were 1) to compile a series of maps showing location and extent of past mining activities and the resulting surface effects: underground and open-pit mine workings, mine shafts and prospects, accumulations of mine waste, tailings and slime ponds, and ground subsidences; 2) to identify areas potentially hazardous to people or property; and 3) to consider methods of protecting the public from existing and potentially hazardous conditions.

The Missouri portion of the Tri-State Mining District comprises approximately 6240 km² (2400 mi²), an area that extends 130 km (80 mi) from Missouri's western border, near Joplin, eastward to Springfield, and 50 km (30 mi) from Neck City, southward to Neosho (10, fig. 1). Lying within these boundaries are 24 mining subdistricts, as recognized by the

³Underlined numbers in parentheses refer to items in the list of references at the end of this report.

TABLE 1. — Conversion factors

To convert	Multiply by	To obtain
inches (in)	2.54	centimeters (cm)
centimeters (cm)	.39	inches (in)
feet (ft)	.3	meters (m)
meters (m)	3.3	feet (ft)
miles (mi)	1.6	kilometers (km)
kilometers (km)	.62	miles (mi)
acres (ac)	.0016	square miles (mi ²)
square miles (mi ²)	640.0	acres (ac)
acres (ac)	.004	square kilometers (km ²)
square kilometers (km ²)	247.1	acres (ac)
square miles (mi ²)	2.6	square kilometers (km ²)
square kilometers (km ²)	.4	square miles (mi ²)
cubic yards (yd ³)	.77	cubic meters (m ³)
cubic meters (m ³)	1.31	cubic yards (yd ³)
short tons	2000.0	pounds (lb)
metric tons	2204.6	pounds (lb)
short tons	.9	metric tons
metric tons	1.1	short tons
cubic yards — chat (yd ³)	1.35	short tons — chat
short tons — chat	.75	cubic yards — chat (yd ³)
cubic meters — chat (m ³)	1.75	short tons — chat
short tons — chat	.57	cubic meters — chat (m ³)
cubic feet per second (ft ³ /sec)	.03	cubic meters per second (m ³ /sec)
cubic meters per second (m ³ /sec)	33.3	cubic feet per second (ft ³ /sec)
cubic feet per second (ft ³ /sec)	448.8	gallons per minute (gal/min)
gallons per minute (gal/min)	.0022	cubic feet per second (ft ³ /sec)

Bureau of Mines for production records (10, pp. 31-56). For the purposes of this study, only a four-quadrangle area, in the vicinity of Joplin, was chosen by the Bureau of Mines for investigation. Figure 1 shows the Missouri study area, which includes most of the large mining subdistricts and which was recognized to contain the densest concentration of mine-related hazards.

Information Sources

Five major types of information were used during this study: 1) mining maps, 2) aerial photographs, 3) published and unpublished literature, 4) field observations, and 5) personal interviews.

Several sets of mining maps were studied in order to collect various data, such as the locations of mine shafts, caved and subsided areas, waste piles and ponds, and the extent of underground mine workings. A set of six maps, entitled "Joplin District Maps," filed at the Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla, was compiled during the early 1920's by Joseph M. Thiel, a Missouri Geological Survey geologist assigned to the Joplin mining area. The set provided the primary data base, to which information was added from other map files. The George M. Fowler Tri-State Mine Map File at the Missouri Geological Survey is an extensive private collection of mining maps and reports prepared by Fowler, who was an eminent mining geologist in the Tri-State District. Another valuable source was the Bureau of Mines repository of Tri-State mining maps, in the Spiva Library on the campus of Missouri Southern College, Joplin. The Schifferdecker Mineral Museum, also in Joplin, maintains a collection of maps, many of which record very early mining efforts.

Three sets of aerial photographs were used during the course of this study. Photo sets dated 1938, 1961, and 1980 provided the historical record of the development of features such as mine waste piles, subsided areas, and mine openings (shafts and prospects). All photo sets were black and white with stereo coverage. The 1938 (1:20,000 scale) and 1980 (1:40,000 scale) photos were compiled by the Agricultural Stabilization and Conservation Service of the U.S. Department of Agriculture; the 1961 set (1:18,000 scale), by the U.S. Geological Survey.

A wide range of published and unpublished literature, was researched as the study progressed. Field notebooks, unpublished theses and manuscripts, mineral-resource inventory files, and various state publications were available at the Missouri Department of Natural Resources, Division of Geology and Land Survey. In addition, numerous journals and federal publications were reviewed at the Bureau of Mines Research Center in Rolla and at the Curtis Laws Wilson Library on the campus of the University of Missouri-Rolla.

Field observations in the abandoned mining areas were an integral part of this study. Fieldwork was directed at the most potentially hazardous areas, as determined by aerial-photo analysis and interviews with local officials, landowners, and other residents. For each mine-related hazard discovered, the location, present condition, and suggested remedial action were recorded. In order to document typical shaft and subsidence problems, photographic evidence was collected at many hazardous sites. Several subsidences that occurred during the course of the study, were visited several times and their reclamation progress monitored.

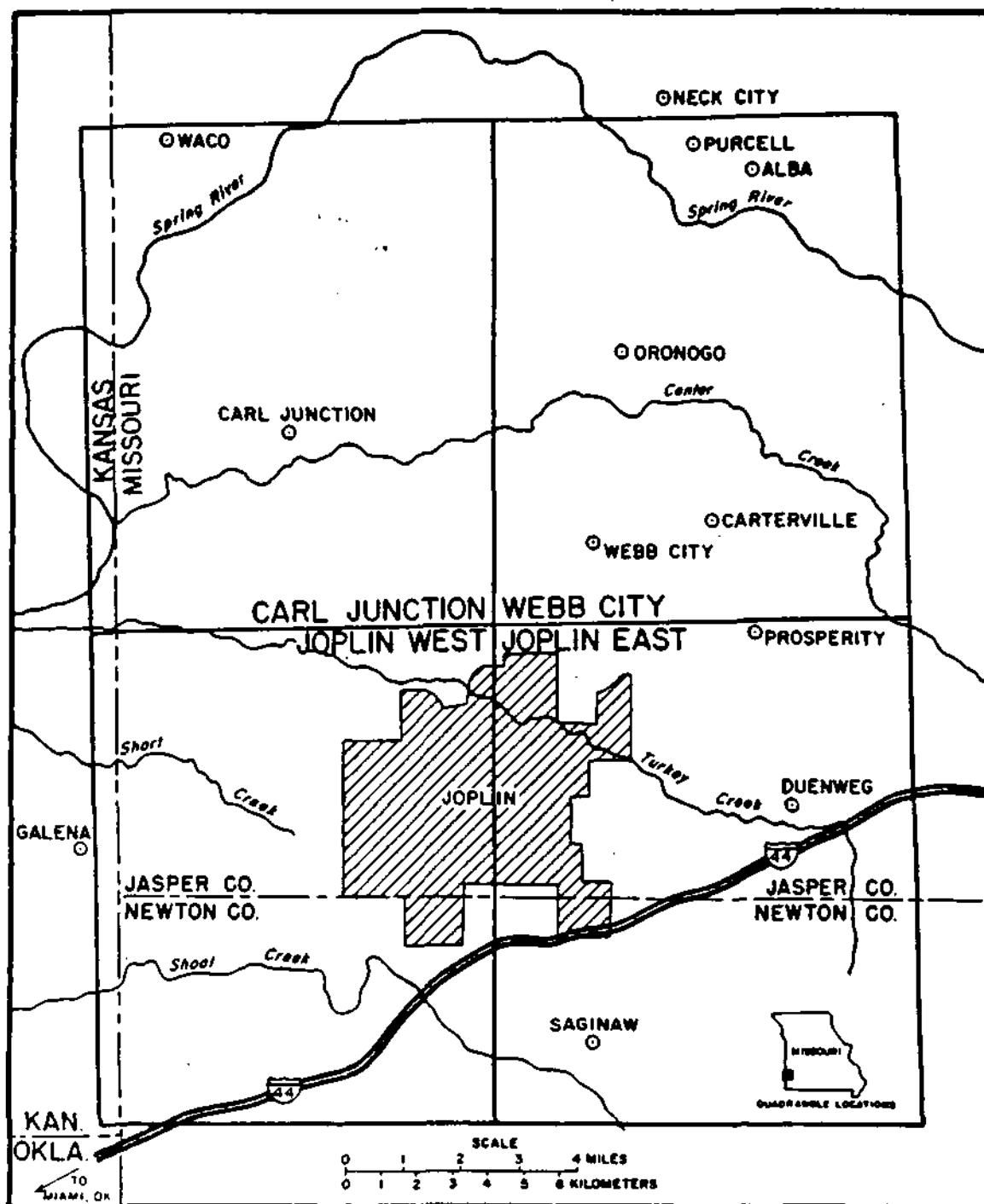


FIGURE 1. — Location map, Missouri study area, Tri-State District, showing U.S.G.S. quadrangle coverage.

Valuable information concerning hazardous areas and reclamation techniques was gained through interviews with landowners, state and city officials, former miners, and local construction workers. At the beginning of the project, a Joplin newspaper was given information concerning the study, in an effort to promote public awareness and cooperation. Throughout the study, other newspapers, both local and out-of-state, requested information as knowledge of the project became widespread.

Map Plates

Three maps (1:24,000 scale) were prepared for each of the four quadrangles in the study area to depict the following mining features: 1) underground mines and shafts; 2) open shafts, pits, and subsidences; and 3) mine and mill waste (piles and ponds). All information shown on the Kansas portions of the Joplin West and Carl Junction map plates was provided by James R. McCauley,⁴ principal investigator for the Kansas study area.

Plates 1A-D show location and extent of all recorded mine openings and underground workings in the project area. From mining maps and aerial photos, an extraordinary number of shafts and prospects were plotted on the four quadrangles (table 2). Outlines of underground workings were also transferred from the numerous map sources. It should be noted that in most mines, additional unsurveyed mining and pillar removal occurred toward the end of operations. In some cases, these unrecorded extensions amounted to a 30 percent increase over the mined-out areas shown on existing mine maps (Dan R. Stewart - pers. comm.).

Plates 2A-D, the focal points of this study, show the location and general nature of each mine-related hazardous site discovered in the four-quadrangle area. The number beside each site refers the reader to descriptive site information listed in tables A-1 and A-2 (appendix A). All Missouri hazardous sites, regardless of type, are numbered consecutively within each section⁵. Depending on hazard type, Kansas sites on the Joplin West and Carl Junction map plates are numbered separately within each section. Open shafts, adits, and pits are indicated by small numbers; subsidence events, by large numbers. Table 3 lists the number and types of Missouri hazardous sites shown on each map plate. Open shafts are holes 6 m (20 ft) or more in depth and 9 m (30 ft) or less in diameter at the surface; most of them contain fluctuating water levels. Open pits and subsidence areas are openings 9 m (30 ft) or more in diameter at the surface and usually contain deep pools of water enclosed by steep, unstable slopes. Reported subsidences are surface cave-ins that have caused damage to property or roads and have subsequently been reclaimed or repaired.

Plates 3A-D are an interpretation of accumulated mine wastes, past and present. The map plates were compiled by detailed inspection and correlation of the 1938, 1961, and 1980 aerial photographs and represent the extent of past mine-related surface activities. The larger tailings and chat piles have been inventoried (15, pp. 34-36, 45-47). Several companies are removing and recycling the wastes, as needed. Some piles shown as intact on the map plates are presently being removed and may have since disappeared. The numerous small mills required many settling and sludge ponds, built as necessary to allow continual operation. Small dikes, usually less than 2 m (6 ft) high, once controlled the

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⁵The term "section," as used in this report, refers to the section-subdivision of a township block of the U.S. rectangular surveying system.

TABLE 2. — Mine openings in Missouri study area

Quadrangle	Prospects	Shafts	Totals
Joplin East	2343	537	2880
Joplin West	3458	595	4053
Carl Junction	1163	229	1392
Webb City	609	672	1281
Totals	7573	2033	9606

TABLE 3. — Hazardous sites in Missouri study area

Quadrangle	Open shafts	Open shafts, collapsed	Open pits	Subsidences	Subsidences, reported	Totals
Joplin East	22	27	1	4	2	56
Joplin West	18	42	0	11	10	81
Carl Junction	4	47	2	36	1	90
Webb City	45	118	4	73	2	242
Totals	89	234	7	124	15	469

tailing sludges and mill ponds, but most are now breached. The small size and shapes of the individual ponds were difficult, sometimes impossible, to detail at the required scale. The majority of the ponds in the district were of this type. Elaborate revetments were constructed in the mining areas to control surface drainage; they were not included in the interpretation. Some Kansas piles and ponds shown on the Joplin West and Carl Junction map plates are numbered and correspond to descriptive information recorded in table A-3 (appendix A).

Tabulations

Three tables (appendix A) were prepared to present specific information pertaining to the various numbered sites appearing on the map plates. All tabular data pertaining to sites in the Kansas portions of the Joplin West and Carl Junction quadrangles were provided by James R. McCauley, principal investigator for the Kansas study area.

Tables A-1 and A-2 list descriptive site information for the hazards shown on plates 2A-D. Four-part site numbers are used to key tabular data to particular hazards. From left to right, each site number gives the following locational information: 1) township, 2) range, 3) section, and 4) hazard number within that section, as shown on the map plates. Thus, the site number 28-32-16-10 refers to the following location: township 28, range 32, section 16, hazard 10 within that section. Data pertaining to open shafts are contained in table A-1. Information on subsidences and open pits is recorded in table A-2. Both tables list hazardous sites by quadrangle, beginning with Joplin East and proceeding clockwise through the study area. Data for hazards lying in the Kansas portions of the Joplin West and Carl Junction quadrangles are listed at the end of each table.

Table A-3 contains descriptive site information for numbered chat piles and tailings ponds on the Kansas portions of plates 3-B and 3-C.

LOCATION, TOPOGRAPHY, AND HYDROLOGY

The Missouri study area (fig. 1), measuring approximately 625 km² (240 mi²), is included within the following USGS 7½-minute quadrangles: Joplin East, Joplin West, Carl Junction, and Webb City, an area comprising a large portion of southwestern Jasper County and a small part of northwestern Newton County. In the project area, Interstate 44 is the major highway and Joplin is the largest city.

The Missouri portion of the Tri-State Mining District lies on the northwest flank of the Ozark uplift. The land surface slopes westward toward Kansas and Oklahoma. Elevations vary from 360 m (1200 ft) on the east to 240 m (800 ft) on the west. Relief in the area ranges from 24 m (80 ft) on the north to 75 m (250 ft) on the south.

The study area lies entirely within the Arkansas River drainage basin (U.S.G.S. Hydrologic Unit #11070207). Spring River, which flows generally westward, is the main drainage channel in the area. Major tributaries, also flowing west, include Center Creek, Turkey Creek, Short Creek, and Shoal Creek. At the height of active mining, circa 1910, in the Duenweg-Webb City-Oronogo field (east half of study area), numerous drainage canals were constructed to divert rain and mine waters away from important production-shaft areas. These canals remain intact as wet-weather tributaries of Center Creek.

Springs in the project area have been measured to flow as much as $0.6 \text{ m}^3/\text{sec}$ ($20 \text{ ft}^3/\text{sec}$), or 9000 gal/min during wet weather (6, p. 26). Several open shafts were found to have artesian flows averaging about $0.06 \text{ m}^3/\text{sec}$ ($2 \text{ ft}^3/\text{sec}$), or 900 gal/min.

Two aquifers exist in the area; a shallow one, in Mississippian limestone, is in the mineralized rock zones; a deep one, in Cambro-Ordovician sandstone and dolomite, is well below the ore-bearing strata (6, p. 1)

GEOLOGY, STRATIGRAPHY, AND STRUCTURE

The zinc-lead ore deposits of the Tri-State region are in cherty Mississippian limestones. The chert occurs as nodules in limestone, and as interbedded layers. From oldest to youngest, the Pierson (Fern Glen), Reeds Spring, Elsey (Grand Falls), Burlington, Keokuk, Warsaw, and Carterville Formations were the host rocks for most of the zinc-lead mineralization. Their total thickness in the area exceeds 120 m (400 ft) (9, p. 59). Figure 2 is a generalized stratigraphic section for the Joplin District.

Small outliers of the Pennsylvanian Cherokee Formation (shales and sandstones) unconformably overlie the Mississippian rocks in some localities. Rich ore bodies are associated with these Pennsylvanian sediments where they have filled dissolution structures (sinkholes and collapses) in the Mississippian strata.

Throughout the Tri-State District, extensive chemical dissolution of carbonate rock produced horizontal and vertical channels, porous breccia zones of insoluble cherts, and other subsurface cavities (14, p. 7). These voids proved excellent repositories for ore precipitation and concentration from mineralized fluids.

Structure in the area is limited to gentle folding, the axes generally plunging northwest. The regional one-degree dip of the sedimentary formations is also northwestward, away from the Ozark uplift (4, p. 411). The Joplin anticline and adjacent Webb City syncline are believed to have influenced the localization of rich trends of mineralization around Joplin and Webb City (11, p. 38). Minor faulting and fracturing provided increased zones of rock dissolution and, eventually, channels for ore-bearing fluids.

ORE DEPOSITS

The major ore minerals of the Tri-State District are sphalerite (zinc sulfide) and galena (lead sulfide). Marcasite, pyrite (iron sulfide), and chalcopyrite (copper-iron sulfide) are of minor importance. Small amounts of greenockite (cadmium sulfide) are also present (14, p. 8).

Near-surface oxidation of these sulfides has produced commercially important amounts of smithsonite (zinc carbonate), cerussite (lead carbonate), and hemimorphite (zinc silicate). Gangue minerals include quartz, calcite, and dolomite, the quartz occurring as chert and secondary jasperoid. A coloring agent in the jasperoid is a dark, opaque material, bitumen, residual organic matter that appears throughout the mining district, usually in tar-like or hardened masses coating rock surfaces (14, p. 8); it is believed to have been instrumental in the chemical reduction of some of the sulfide ores (7, p. 3).

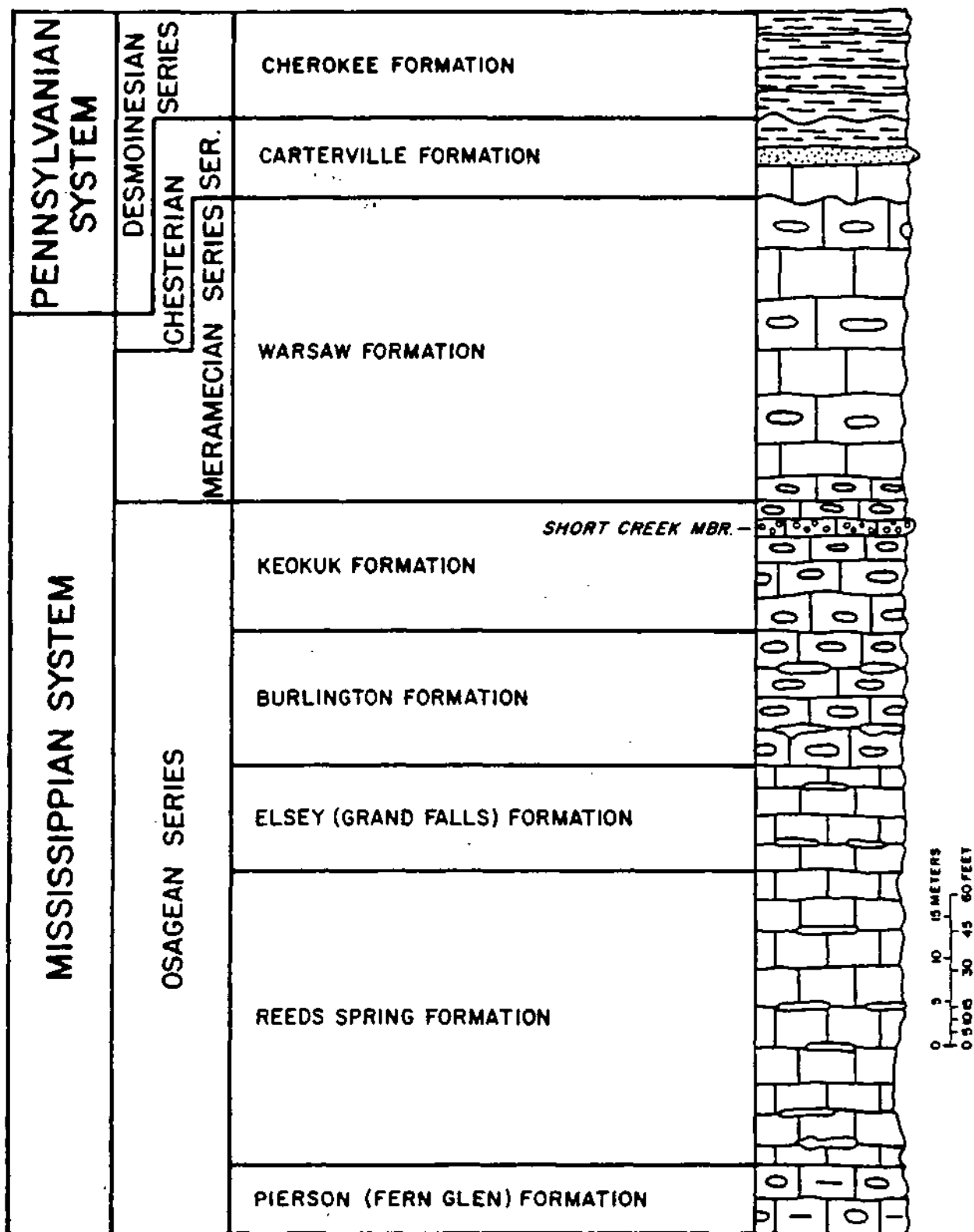


FIGURE 2. — General stratigraphic section, Joplin District (modified from 9, pp. 59-81).

In Missouri the ore deposits of the Tri-State District have been classified into two main divisions: 1) upper-ground, or "broken-ground," deposits and 2) lower-ground, or "sheet-ground," deposits. The upper-ground ore zones are associated with incompetent layers of porous chert breccias and loose, unconsolidated masses of clay-like materials, both being remnants of intensive underground solution processes. The lower-ground ores are present in more competent beds. Mineralization has filled flat, sheet-like voids dissolved out between insoluble chert layers.

The ore bodies have several basic shapes, their irregular boundaries determined by the variable host chambers and channels within the dissolved carbonate rock strata (16, pp. 59-60). "Runs," long, relatively narrow bodies, tend to occupy the chert breccias and enlarged solution joints of the upper-ground. "Circles," arcuate, oval, or circular bodies, develop about shale-filled sink and collapse structures. "Sheets," flat, tabular bodies of considerable areal extent, occur in the lower-ground and are intercalated with thin chert beds.

The genesis of the Tri-State ore deposits has been studied and debated for over a century. Several processes have been proposed to explain the manner in which the ore-bearing solutions were introduced into Mississippian strata in this region (19, p. 469). Two theories have been generally accepted as the most satisfactory in explaining these deposits. One states that downward-percolating groundwaters, rich in metals, entered all available subsurface dissolution structures and precipitated the ores (5, p. 14); the other, that artesian-circulating groundwaters transported the metals through favorable structural weaknesses, ascended into the solution cavities, and precipitated the ores (4, pp. 428-429). Further studies will undoubtedly lead to additional theories in attempting to prepare a precise reconstruction of the events responsible for one of the most productive zinc-mining districts in the world.

MINING HISTORY, PRODUCTION, AND RESERVES

The discovery of lead ores in the Joplin, Missouri, area during 1848 marked the beginning of mining in the Tri-State District (16, pp. 56-57). The associated zinc ores were originally discarded for lack of an efficient, economical technology for recovery of the zinc. About 1870, however, the extension of railway lines into southwestern Missouri and the development of new milling and smelting techniques led to the first production of zinc in the area (18, p. 127). By 1875, Missouri had become the leading zinc producer in the nation. Early mining tracts were small, some leases measuring as little as 60 x 60 m (200 x 200 ft), or about 1 ac (12, pp. 19-20). Mining was confined to the upper-ground ore zone, within the first 30 m (100 ft) or so of the surface. Due to the "broken" nature of this ore zone, drifting operations were limited; therefore, many shafts were sunk at close intervals. In fact, Missouri laws required two shafts for each property, usually within 90 m (300 ft) of one another (8, p. 150). As a result, thousands of production and prospect shafts were sunk in the district. Table 2 shows the numerical distribution of these shafts, as determined for each quadrangle in the study area.

As easily accessible mineralized areas were exhausted, shafts were sunk deeper, eventually encountering the lower-ground ore zone, below 30 m (100 ft). "Sheet-ground" ore bodies, ranging in thickness from 2-4 m (7-14 ft), were mined by the room-and-pillar method (3, p. 9). From 1902-1907, Harry Kimball of the American Zinc, Lead, and Smelting Company developed mechanized volume-mining methods that allowed these low-grade, but very extensive, "sheet-ground" areas to become profitable before World War I

(12, pp. 21-27). High prices for zinc and lead concentrates during the war led to a mining boom, lasting until 1917, in the Joplin and Webb City fields of Missouri. A severe collapse of metal prices followed the conclusion of World War I and caused a rapid decline in mining from which the Missouri Tri-State has never recovered. Operations were shifted to Oklahoma and Kansas, where extensive deposits had been discovered and large-scale projects were already underway.

By 1920, most major mines in Missouri had closed, and the Picher Field of Oklahoma had become the leading producer of zinc in the United States, continuing that prominence through 1946. Several districts in Kansas had also attained high production totals. During World War II, increased metal prices and government subsidies permitted operators of some Missouri "sheet-ground" mines to rework low-grade ore deposits at a small profit (4, p. 403). The last significant production in Missouri was in 1957, but intermittent output continued into the late 1960's (16, p. 58). A summary of Missouri's production is given in table 4.

As indicated by table 5, considerable ore reserves remain within the Missouri portion of the Tri-State District. Approximately 87 percent of the Missouri ore reserves were under water at the end of 1947 (13, pp. 17-18). Most of these flooded deposits are in the Duenweg-Webb City-Oronogo "sheet-ground" field, the largest single area of remaining ore reserves in the Tri-State District.

MINE AND MILL WASTE UTILIZATION

Before 1900, in the Missouri portion of the Tri-State District, state laws and local mining methods dictated that existing small tracts and leases be used by the mining companies (8, pp. 148-150), who could, in turn, sublease them or portions of them to individual miners. Many concentrating mills and plants were necessary for individual mining companies to calculate their royalties. The size of each mill varied with the size of the mine or mines being served, and their associated wastes and disposal areas varied accordingly.

Waste products (tailings) consist of varying sizes of angular chert fragments: chats (1 cm, or 3/8 in, to 35 mesh); sands (35 mesh to 65 mesh); and slimes (65 mesh to 200 mesh) (14, p. 13). A large accumulation of graded tailings is shown in figure 3. Boulders (20 cm, or 8 in, and larger) consist of chert and limestone with associated minerals and gangue. Figure 4 illustrates a large boulder pile. Usually the boulders and chats are mixed and stacked near the mill. In many cases, these piles are directly over underground workings, increasing the roof load and the chances of subsidence. In figure 5, the tops of "sunken" waste piles are visible in the central portion of the subsidence pit. The slimes are concentrated in settling ponds controlled by earthen dikes.

Remilling of tailings resulted in the relocation of many chat piles. Chats have been processed for use as railroad ballast, road metal, and aggregates in asphalt paving and portland cement concrete. Sands and smaller sizes have been used for abrasives, roofing granules, pipe coatings, and filter sands (16, p. 168). Boulders have been used for fill material and rip-rap, with some crushing to smaller sizes for use as ballast. It has been estimated that 80 percent of the mine wastes have been removed and recycled (14, p. 13). The Independent Gravel Company operates two recycling plants in the area, reporting approximately 230 m³ (300 yd³), or 400 short tons, per day to produce sand blasting

TABLE 4. — Mine production statistics for Missouri portion of Tri-State District, 1907-1945¹

Unit	Material treated		Metal recovered	
	Crude ore	Old tailings	Zinc	Lead
Metric tons	108,026,062	4,016,877	3,157,656	780,215
Short tons	120,028,958	4,463,197	3,508,507	866,905

¹Short ton data from 10, pp. 22-23.

TABLE 5. — Ore reserve estimates¹, based on 1½-percent cut-off, for Missouri portion of Tri-State District, December 31, 1947²

Unit	Crude ore	Recoverable concentrates	
		60-percent zinc	80-percent lead
Metric tons	24,440,400	812,065	57,740
Short tons	27,156,000	902,294	64,156

¹Based on measured, indicated, and inferred ore.

²Short ton data from 13, p. 14.



FIGURE 3. - Mine waste pile, containing mixed chats.



FIGURE 4. - Mine waste pile, containing chats and boulders.

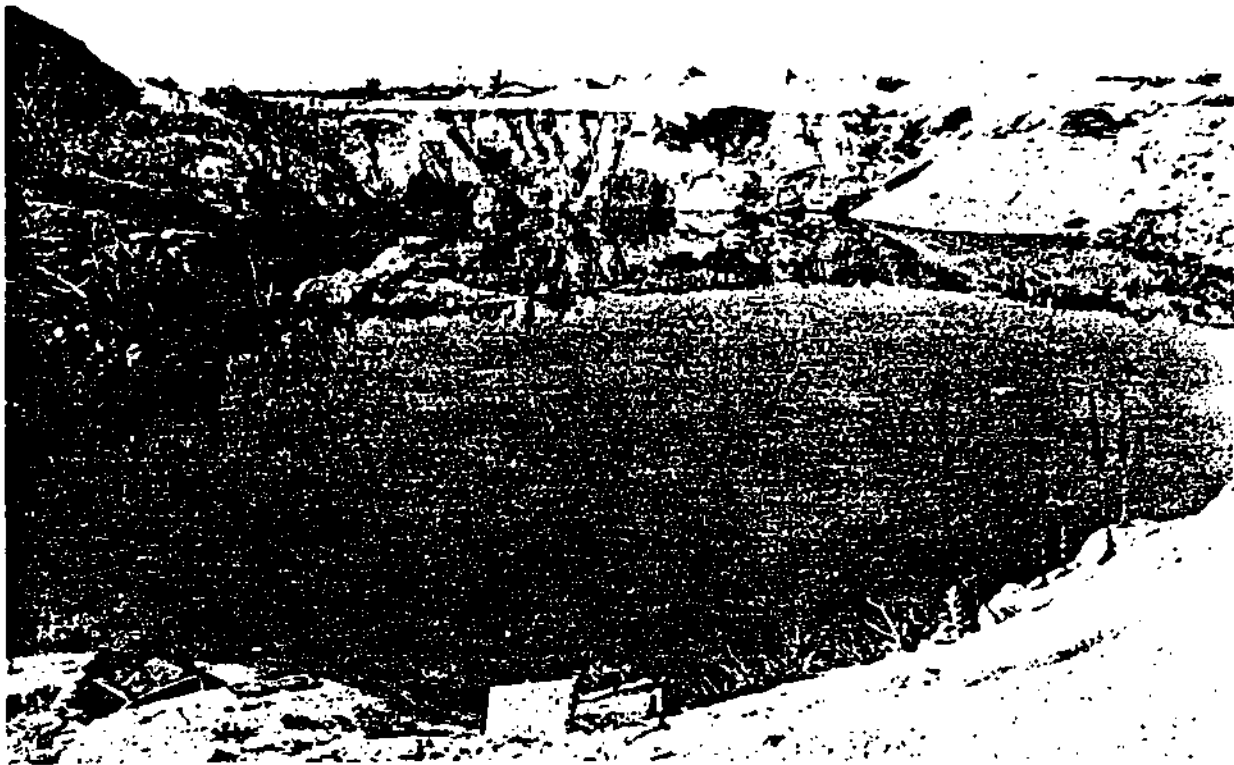


FIGURE 5. — Mine waste pile, subsided below surface.



FIGURE 6. — Reclaimed mine area, utilizing leveled chats.

materials (17, p. 25). Several smaller companies also process the mine tailings for commercial use.

Estimated reserves of approximately 6,000,000 m³ (8,000,000 yd³), or 10,000,000 short tons, in waste products exist in the study area (15, pp. 56, 60). As shown in plates 3A-D, very few large piles remain. Extensive areas of scattered mounds and thin-layered "chat-flats" exist throughout the study area. Some areas have been reclaimed by leveling and incorporating the remaining chats with the soils and overburden. Figure 6 shows such an area reclaimed for industrial use. Most waste piles and their surrounding areas are barren, except for refuse dumps, and are likely to remain in this unsightly condition. Reclamation will be expensive.

DESCRIPTIONS OF HAZARDS AND SUGGESTED METHODS OF CONTROL

The tables in this report (appendix A) indicate that many actual and potential safety hazards and environmental problems have resulted from over a century of mining in the project area. Open mine shafts, subsided areas having steep, unstable slopes, and open pits containing deep pools of water exist throughout the region. Damage to buildings and roads above shaft areas and underground mine workings have been reported. Accidents to people and livestock frequenting or wandering into abandoned mining sites in rural areas have also occurred. In addition, water-quality problems result from artesian flow of mine waters from open shafts, and rainwater runoff and seepage from tailings piles and settling ponds. In the following paragraphs, typical hazards and problems are described and several methods of controlling or eliminating them are suggested.

Some 323 open mine shafts have been located and described during the course of this study (table 3). Their surface expressions range from 0.9 m x 0.9 m (3 ft x 3 ft) square holes with vertical sides to 15 m (50 ft)-diameter openings with unstable, funnel-shaped slopes. Figures 7, 8, and 9 illustrate typical shaft openings. Depths to water level were found to be as much as 36 m (120 ft); however, some shafts were water-filled to the surface or actually having artesian flow (fig. 10). Some shafts descend to dry, choked bottoms 4.5 - 18 m (15 - 60 ft) below the surface. These dry-bottomed holes result from partial filling with various materials, such as mine waste-rock, junk-metal, forest debris, and assorted household trash. The most hazardous sites are open shafts concealed by surrounding trees and/or other vegetation.

Effective methods of closing off or, at least, safeguarding these dangerous openings are badly needed. Backfilling with available tailings and mine waste-rock would provide closure and aid in reclaiming affected lands. Concrete foundations, boulder piles, and chat accumulations in most cases are immediately adjacent to open shafts. These materials could be used as fill. It is only necessary that earth-moving machinery have access to the shaft area. Although many backfilled shafts observed in the field show slumping and settling of the fill, the danger of long, vertical drop-offs has been effectively removed. Figures 11, 12, and 13 depict shafts backfilled with various materials.

Another method of closing a dangerous shaft is sealing, or capping, the opening at the surface. Such a procedure requires competent rock around the shaft opening and some type of solid base to which a seal can be attached. Open shafts with concrete collars or wood cribbings intact at the surface possess suitable bases for several types of temporary seals. Metal plates welded together and anchored securely to a base form an effective closure (fig. 14). Metal or wooden cross-members have been placed over a base and covered with poured concrete mixes or heavy slabs (fig. 15).

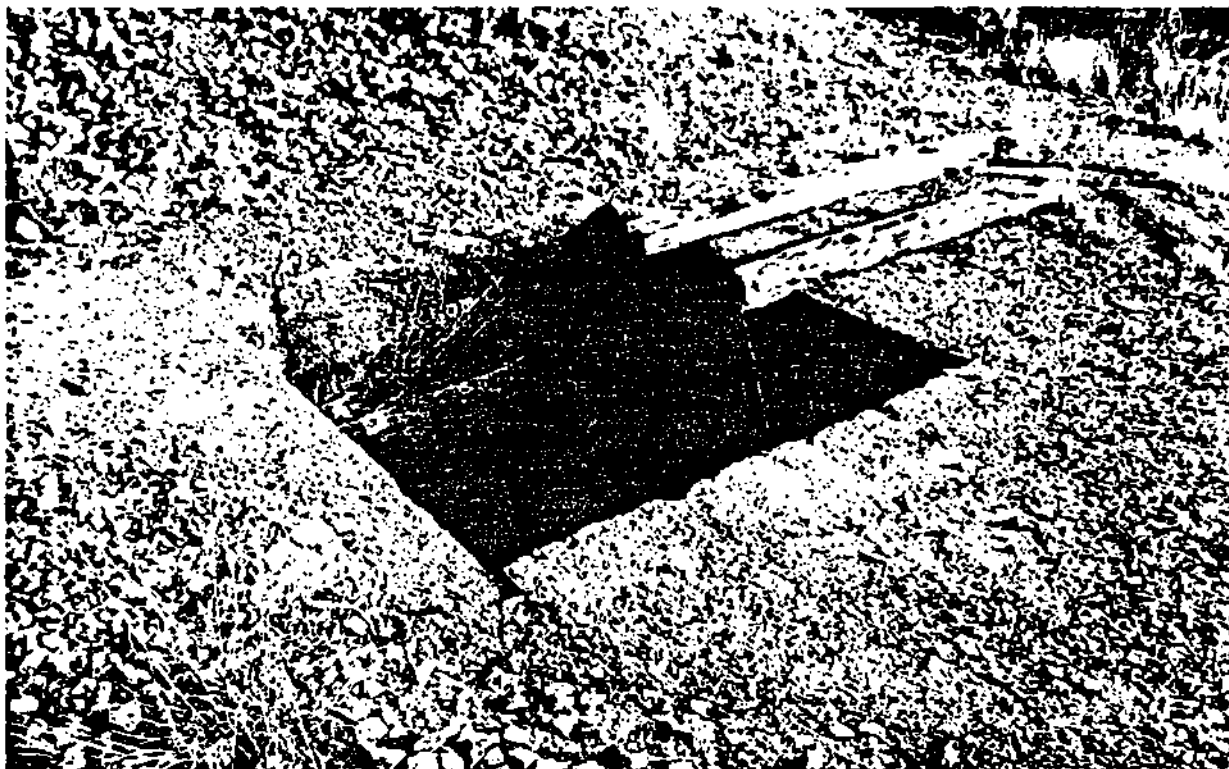


FIGURE 7. — Open shaft with intact concrete collar.

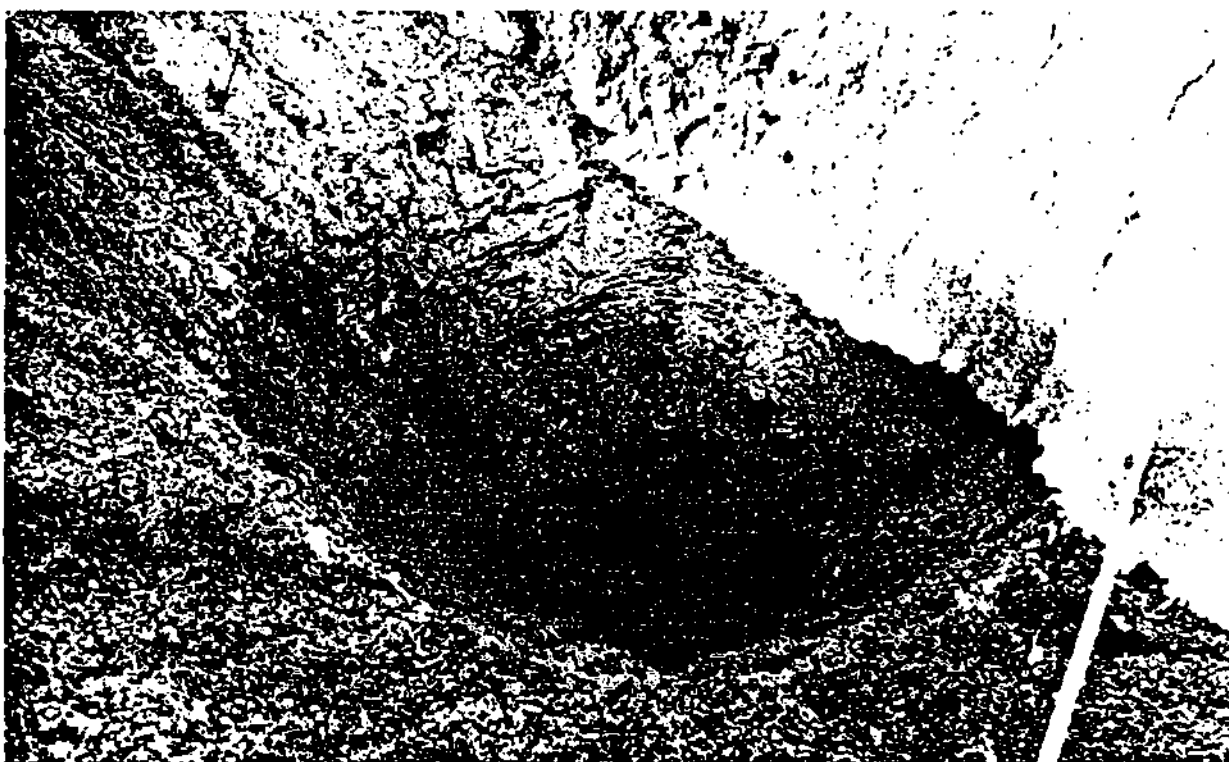


FIGURE 8. — Open shaft with funneling sides.

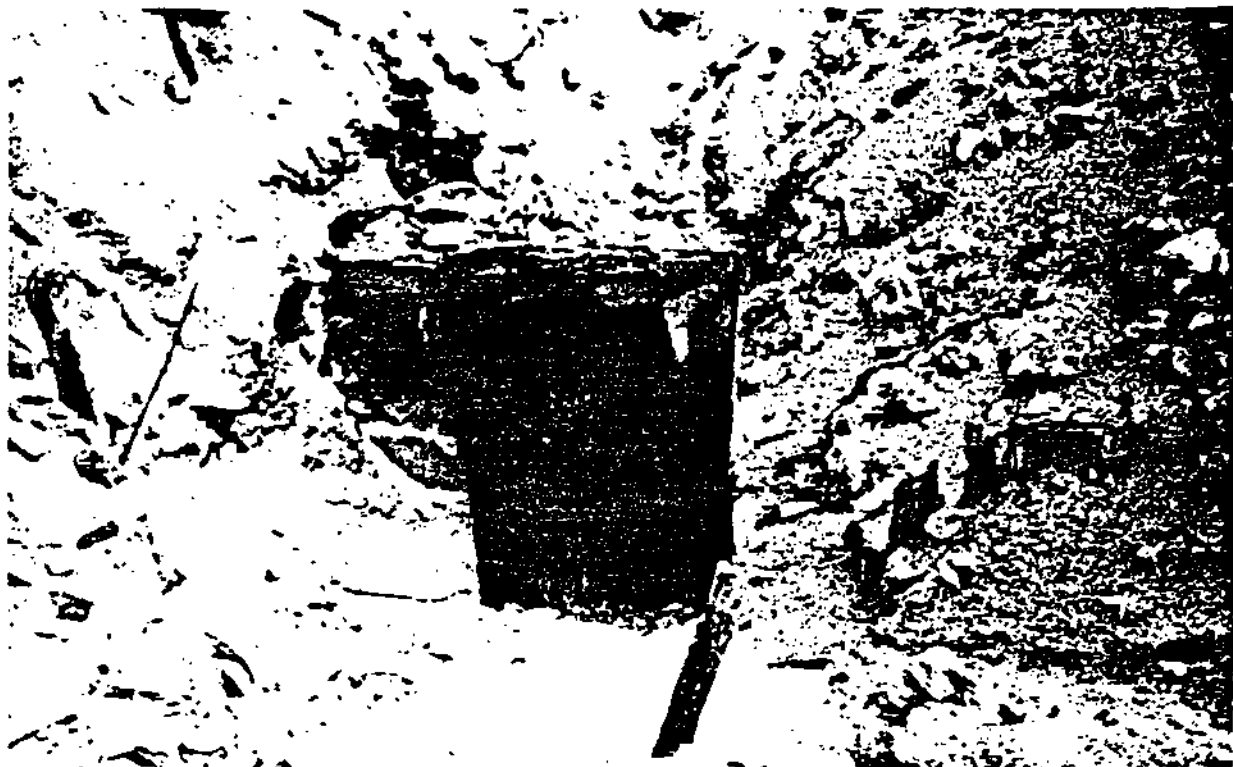


FIGURE 9. — Open shaft with collapsed wood-cribbing.



FIGURE 10. — Artesian shaft, issuing mine waters.



FIGURE 11. — Closed shaft, filled with rubbish.



FIGURE 12. — Closed shaft, backfilled with chats.

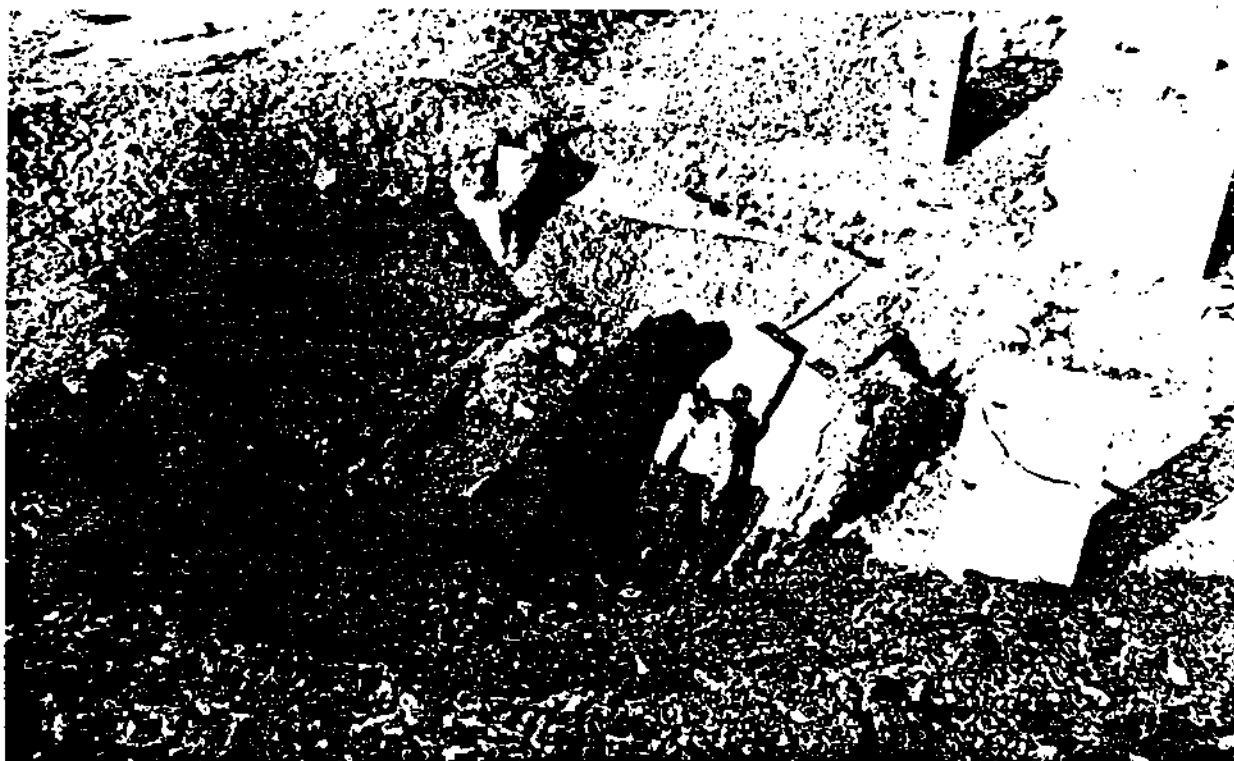


FIGURE 13. — Closed shaft, backfilled with chats and concrete foundations.



FIGURE 14. — Closed shaft, protected with metal plates.

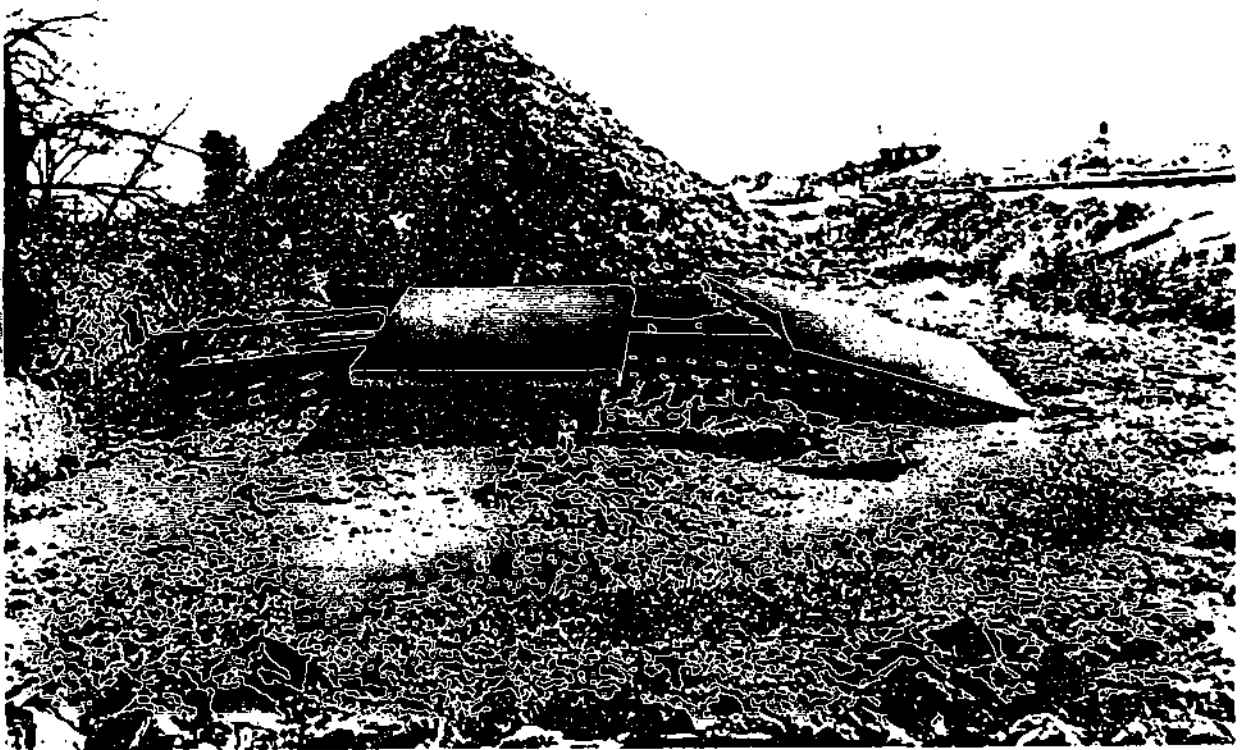


FIGURE 15. — Closed shaft, protected with concrete slabs.

Some open shafts lead to underground mines having considerable ore reserves. In such cases, suitable procedures would be to affix a temporary cap, as shown in figure 14, or erect sturdy metal fencing around openings and post "danger" signs, a method that would serve to warn but still allow access to the mineral reserves. Figures 16 and 17 show enclosures around open shafts lying above "sheet-ground" reserves in the Duenweg-Webb City-Oronogo field.

In the project area, 124 subsided areas have been inventoried (table 3). They are round, oval, or elongate pits usually containing deep pools of water and having steep, unstable slopes (fig. 18). The pits are .002 - .04 km² (.5 - 10 ac) in area. These collapsed areas closely follow the outlines of underground workings, evidence that weak and/or thin roof rock once capped these mines. Subsidence pits are water-filled where they are directly connected to flooded underground mine workings. Dry-bottomed subsidences occur where such connections no longer exist. Subsidence pits have long been popular dump sites for all kinds of refuse (fig. 19), a practice that has only added to the problems of water pollution and unsightly abandoned mined lands.

Because water-filled pits are directly connected to the mines, backfilling the pits and plugging their connections to underground workings seems the only solution, but would require enormous amounts of fill. Unfortunately mine and mill wastes adjacent to subsided areas could hardly begin to provide enough material for such attempts; hence, other economical fill materials would have to be procured.

The steep slopes of dry subsidence pits could be reduced to gentler grades, thus removing the primary danger of near-vertical drop-offs. Backfilling could also be attempted if sufficient fill material were available. In all cases, posting of "danger" signs would provide minimum initial safeguards. The potential for future collapse of these pits into the mine workings with subsequent flooding exists.

In areas where zinc and lead ores were highly concentrated, open-pit mining was employed (3, p. 9); seven such sites have been inventoried (table 3). Large circular holes over 60 m (200 ft) deep and up to 240 m (800 ft) in diameter were carved out by the miners. These large voids are almost completely filled with water today, constituting dangers similar to those of flooded subsidence areas. Because of their immense size and accessibility, local people regularly visit these sites for scuba-diving, swimming, and fishing (fig. 20). Drownings have been reported at the famous Oronogo Circle (fig. 21) since it began to fill with water after 1948 (16, p. 222). People are currently aware of the inherent dangers associated with these abandoned open pits, but continue to enjoy recreational activities at these sites.

Mine-related water-quality problems exist throughout the study area. Many open shafts were found to have wet-weather or perennial artesian flow of mine waters to the surface. Rainwater runoff and seepage from waste piles is also common. The effects of these processes have been examined (1) and some possible solutions proposed (14, 17). Stability problems arise as the downward movement of surface waters accelerates deterioration of ground adjacent to open shafts, thus promoting further collapse. In addition, subsided areas experience increased widening of their perimeters as well as further steepening and undercutting of their slopes. Backfilling or sealing hazardous sites would greatly reduce the damaging effects of such waters. Fenced areas around open shafts should be of sufficient size to prevent fences from being undercut by gradual collapse near the tops of the shafts.

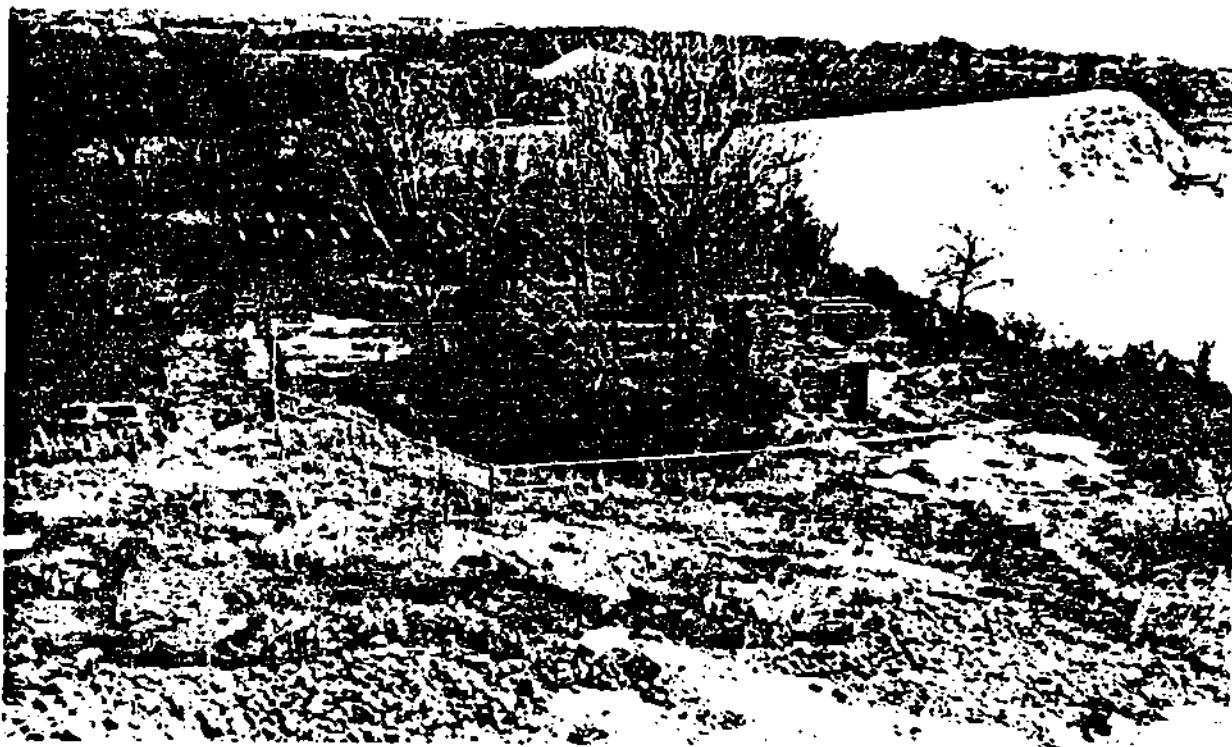


FIGURE 16. — Open shaft and collapsed area, safeguarded with metal fencing.

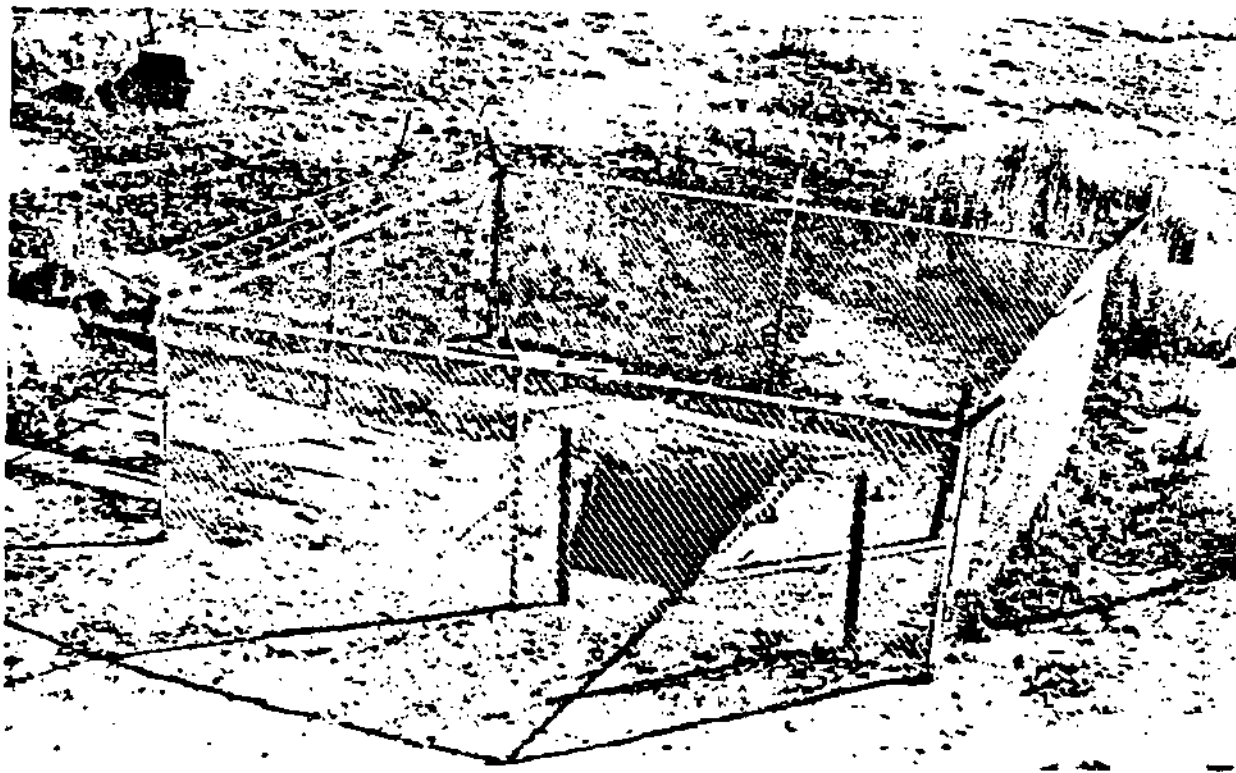


FIGURE 17. — Open shaft, safeguarded with metal fencing.



FIGURE 18. — Subsidence pit, filled with water.

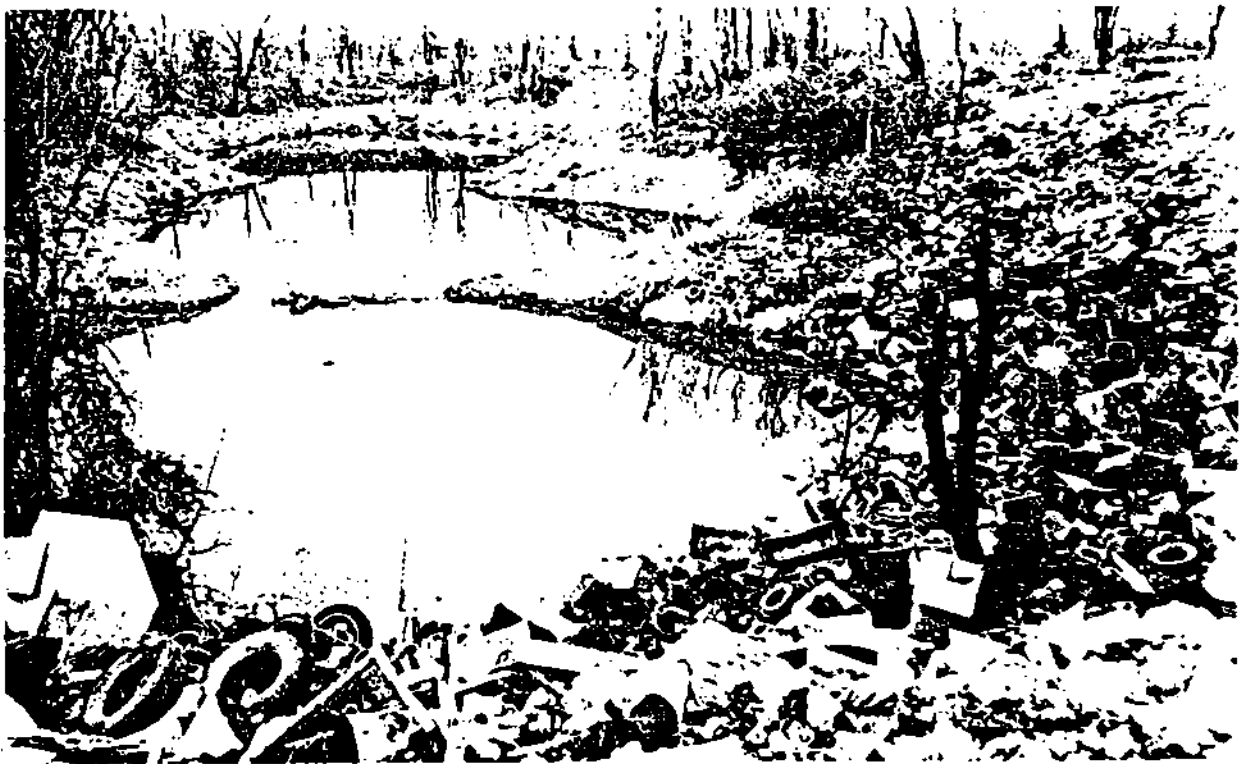


FIGURE 19. — Subsidence pit, filled with water and rubbish.



FIGURE 20. — Open pit, filled with water and used as recreational area.



FIGURE 21. — Oronogo Circle, famous open pit, now filled with water.

AREAS WITH POTENTIAL FOR FUTURE SUBSIDENCE

The problems of mine roof collapse and the ensuing surface subsidence were recognized in this region before 1900 (7, pp. 13-16), but mining methods, based on custom and economy, continually resulted in cave-ins throughout the district. Many subsidences, large and small, have occurred and plates 2A-D illustrate the current situation. The possibility of future mine-related collapses is very real. During this study, field observations disclosed several areas believed to be particularly prone to further stability problems.

In the Joplin East Quadrangle, the mining field lying between Duenweg and Prosperity was found to contain 48 hazardous sites (secs. 3 and 4, T. 27 N., R. 32 W.; secs. 28, 29, 33, and 34, T. 28 N., R. 32 W.). Slumping of chat piles, ever-increasing collapse around the tops of existing open shafts, and the enlargement of subsidence pits indicate that the area should be considered unstable. Large waste piles are directly above the underground mine workings and add to the inherent tendency for roof collapse (7, p. 16). Although this area is not densely populated, many owners of motorcycles and four-wheel-drive vehicles frequent its numerous mud flats and chat hills. In addition to potential subsidence and collapse, the chances for bodily injury are constantly present.

A belt of some of the oldest underground workings in the study area extends along the common boundary of the Joplin East and Joplin West Quadrangles (secs. 2, 11, 12, 13, and 14, T. 27 N., R. 33 W.), an area that includes business and residential sections within the city limits of Joplin. Several subsidences have occurred here during the past decade, causing minor road and property damage. At site number 27-33-2-1, a hole developed in the roadbed of Murphy Boulevard at 5th Street. This subsidence, 9 m (30 ft) deep and 2.5 m (8 ft) in diameter, was filled and repaired by the City of Joplin (fig. 22). At site number 27-33-2-2, the 7th Street bridge, above Joplin Creek, was found to be gradually sinking on its north side. The amount of movement is being monitored by the Missouri Highway and Transportation Department. At Murphy Boulevard and 15th Street (site number 27-33-12-1), construction of the First Community Church was hampered by foundation problems. A multistory structure was planned, but, after the first level was built, it was determined that the ground was sinking. The basement was damaged by severe cracking and settling. At 15th Street and Kansas Avenue (site number 27-33-12-2), a hole of unknown depth developed in the yard of a private residence. The opening was subsequently filled, and a field check disclosed no evidence of further settling. These reported subsidences have occurred above mine workings 12-36 m (40-120 ft) below the surface. In addition, many mine shafts had been sunk in this area. Due to the extensive, relatively shallow mining and the recurrent ground failures, this region should be considered unstable.

Recent subsidences have also occurred at the southwest edge of Joplin (secs. 15 and 16, T. 27 N., R. 33 W., Joplin West Quadrangle). Ground failures in this area are underlain by several levels of mine drifts within 24 m (80 ft) of the surface. At site number 27-33-16-1, the City of Joplin filled and repaired a collapse hole, 6 m (20 ft) in diameter, in the roadbed of 32nd Street at McClelland Street (fig. 23). About 600 m (2000 ft) northeast of this intersection, a hole, 9 m (30 ft) deep and 4.5 m (15 ft) in diameter, opened in the parking lot of the Ozark Health Center (site number 27-33-15-1) during October 1981. A rock fill was placed in this subsidence, but sinking of the fill material was observed during early 1982. Approximately 240 m (800 ft) west of the Ozark Health Center, a major



FIGURE 22. — Repaired subsidence in roadbed, Murphy and 5th Streets, Joplin.



FIGURE 23. — Repaired subsidence in roadbed, McClelland and 32nd Streets, Joplin.

subsidence occurred on June 1, 1982, in the parking lot of the St. John's Regional Medical Center (site number 27-33-15-3). The resulting hole was 20 m (60 ft) deep and filled with water to within 6 m (20 ft) of the surface. The oval-shaped surface outline, measuring 3 x 6 m (10 x 20 ft), is shown in figure 24. A fill of rock and concrete mix has temporarily sealed the opening at this site (fig. 25). It is apparent that this area holds a high potential for future, subsidence-related problems.

There is an extensively mined area, known locally as Chitwood, at the northwest edge of Joplin (secs. 3 and 4, T. 27 N., R. 33 W., secs. 32 and 33, T. 28 N., R. 33 W., Joplin West Quadrangle). Sixteen open shafts and three subsidence pits were observed. The majority of these openings are either filled with water to the surface or have artesian flow. Some "warning" and "danger" signs have been posted; however, public access is not controlled and therefore the entire area is quite hazardous because it is near populated sections of Joplin. A similar situation exists just west of Joplin, near Central City, where 16 water-filled open shafts were found (secs. 5 and 6, T. 27 N., R. 33 W.). At site number 27-33-5-1, major cave-ins in the roadbed of West 7th Street (old U.S. 66) resulted from collapsing mine workings below. The Missouri Highway and Transportation Department carried out large-scale repairs during the 1940's, 1963, and 1981.

Another locality in the Joplin West Quadrangle was found to contain 25 hazardous sites that revealed recent collapse features (secs. 19 and 20, T. 27 N., R. 33 W., sec. 24, T. 27 N., R. 34 W.). The surface edges of the subsidence pits are badly undercut by recent caving, and the open shafts show fresh collapse in their loosely consolidated rock walls. In cross-section, the openings are dome-shaped. Because the area is private property, access is somewhat controlled; however, the posting of "danger" signs would be an additional, economical safeguard.

In the Carl Junction Quadrangle, two areas are notable for their dense concentration of mine-related hazards. The first area, just southwest of the city of Carl Junction (sec. 7, T. 28 N., R. 33 W.), contains 15 open shafts and 5 subsidence pits. The shafts are in advanced stages of collapse; the subsidence pits, up to 30 m (100 ft) in diameter, are water filled. Public access to these sites is uncontrolled. The second area, southwest of the town of Waco, adjacent to the Missouri-Kansas border (secs. 14, 15, 22, and 23, T. 29 N., R. 34 W.), is honeycombed with 28 open shafts and 23 subsidence pits, all of which have incompetent Pennsylvanian strata in their upper walls. These weak surface layers of rock are largely responsible for the extensive collapse throughout this area. Water quality is also a problem here. Enormous amounts of rubbish are being dumped in and about the water-filled subsidence pits. Reddish-brown mine waters are spilling onto the surface from several shafts with artesian flow. It is expected that mine-related problems (surface stability, open shafts, and water quality) near Waco will continue and intensify.

Field observations disclosed more hazardous sites (242) in the Webb City Quadrangle than in the other three quadrangles combined (227). Nearly all 242 sites are within two distinct northwest-southeast trends. One trend, 3.2 km (2 mi) long and 1.6 km (1 mi) wide, is near the towns of Alba, Purcell, and Neck City; the other, 8 km (5 mi) long and 2.4 km (1.5 mi) wide, extends from Prosperity to Ononogo, and includes the ground between Webb City and Carterville.

Twelve subsidence pits and 11 open shafts were discovered in the vicinity of Alba, Purcell, and Neck City (secs. 8, 9, 10, 15, and 16, T. 29 N., R. 32 W.). The caving walls of the openings are composed of loosely consolidated Pennsylvanian shales and sandstones.

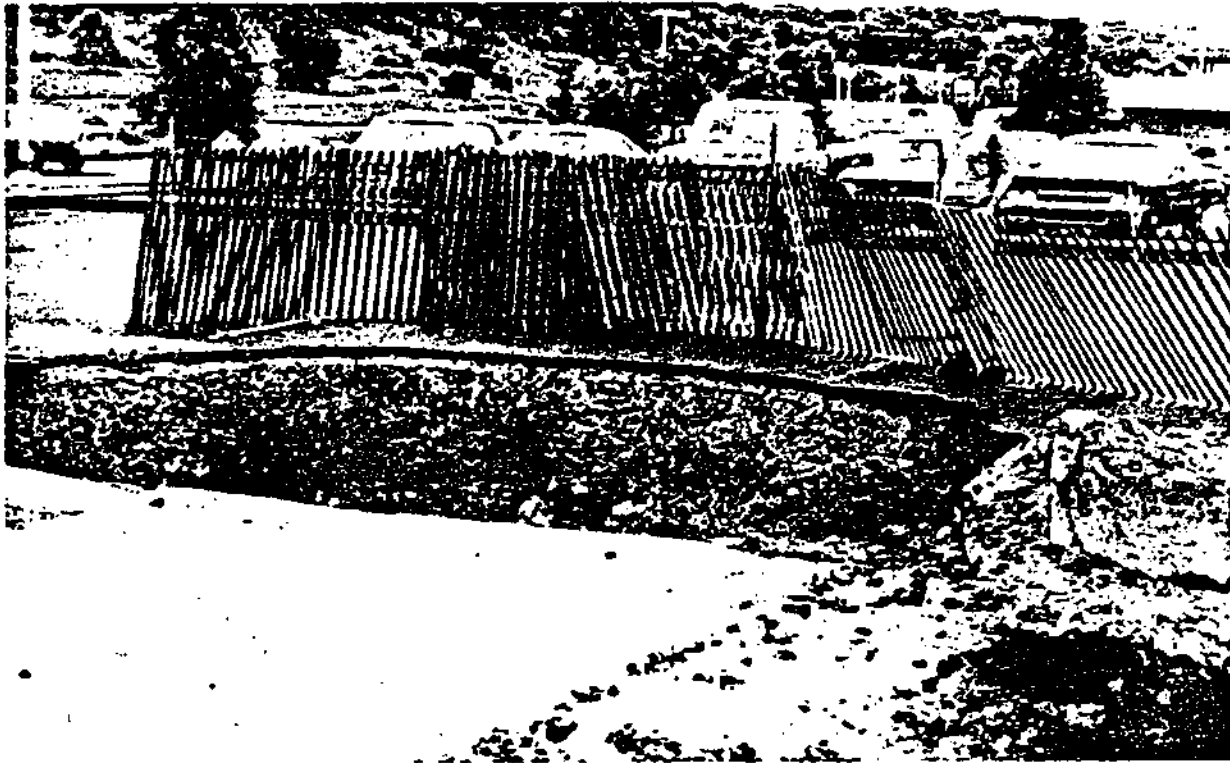


FIGURE 24. — Subsidence in parking lot at St. John's Regional Medical Center, Joplin.



FIGURE 25. — Repaired subsidence in parking lot at St. John's Regional Medical Center, Joplin.



FIGURE 26. — Collapsed area within chat pile.

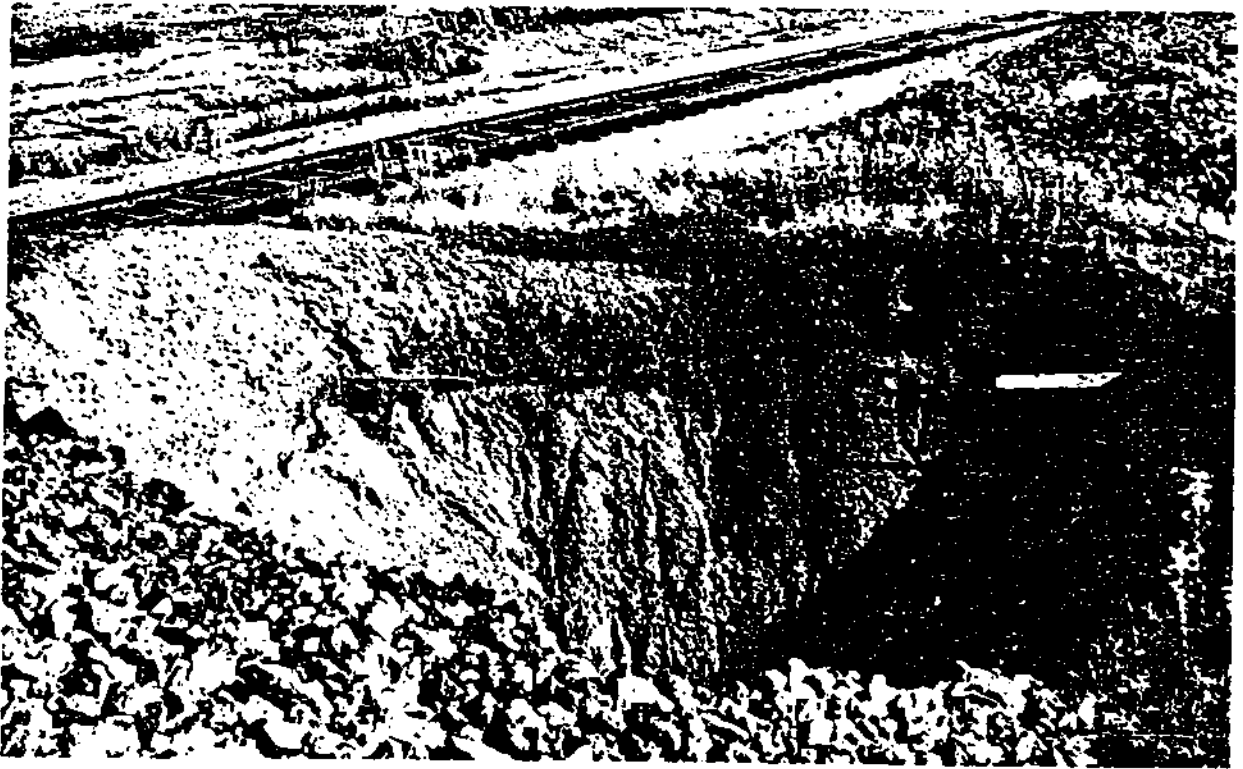


FIGURE 27. — Collapse at top of open shaft, encroaching on railroad.

Recent collapse is evident at many sites. Trash dumps were observed adjacent to those pits and shafts that are easily accessible. Both stability and environmental conditions in this area are likely to degrade further.

Fourteen hazardous openings, characterized by collapsing beds of incompetent Pennsylvanian rock in their steep, caving sides, are present in a very unstable tract of land (NW¼ SW¼ sec. 31, T. 29 N., R. 32 W.), just east of the renowned Oronogo Circle. Depths to water level in these holes range from 4.5 - 15 m (15 - 50 ft). Because of their proximity to the town of Oronogo, these sites should be backfilled or fenced to provide some degree of public protection.

A total of 196 hazardous sites (141 open shafts and 55 subsidence pits) were found in an area extending 3.2 km (2 mi) northwest-southeast on either side of Webb City and Cartersville (secs. 6, 7, 8, 17, 18, 20, and 21, T. 28 N., R. 32 W., secs. 1 and 12, T. 28 N., R. 33 W.). The land between these two cities is particularly crowded with dangerous mine openings; there are 87 hazardous sites in an area of approximately 2 km² (500 ac). In addition, refuse dumps are abundant, and several shafts with artesian flow are discharging reddish-brown mine waters into Mineral Branch (known locally as "Ben's Branch"), a tributary of Center Creek. Only a comprehensive reclamation program will improve such conditions. Another 109 hazardous sites were seen outside the two cities. The most seriously affected areas are near Center Creek (sec. 6, T. 28 N., R. 32 W.) and Prosperity (sec. 21, T. 28 N., R. 32 W.), where subsidence has caved in 0.014 - 0.016 km² (3.5 - 4 ac) tracts of surface ground (site numbers 28-32-6-16 and 28-32-21-24). Public access to hazardous sites in these regions is largely uncontrolled. Fencing mine openings and posting "danger" signs would provide inexpensive, temporary safeguards.

A final consideration with respect to future stability problems concerns the potential for reopening of backfilled shafts. Funnel-shaped depressions in tailings piles result from gradual settling and subsidence of fill materials into shafts beneath the piles (fig. 26). Most backfilled shafts in the study area also show slump features at the surface (figs. 11 and 13). This same deterioration process is occurring around tops of open shafts. Sloughing of easily eroded soils and incompetent rock layers has caused many open shafts to expand laterally at the surface. Figure 27 illustrates a collapsing shaft encroaching on a nearby railway line, thereby posing dangers to personnel and equipment. Caving and subsidence at shaft sites, both open and closed, will continue to be a persistent problem.

SUMMARY OF LAWS APPLYING TO ABANDONED METAL-MINING AREAS

The following is a compendium of federal and Missouri laws pertaining to abandoned metal mines and lands. The federal surface mining laws apply primarily to coal mining; however, sections are included which address the problems of non-coal mining. It should be noted that funds will be used for non-coal problems only if public health and safety considerations are endangered. This allows the Governor to request that moneys be used from the trust fund established for this purpose. The Abandoned Mine Reclamation Fund is administered by the Secretary of the Interior through the Office of Surface Mining. All coal reclamation projects have priority to draw on the fund. As coal reclamations are completed, the remaining money in the fund could be used for non-coal reclamations. Continued research for effective and adequate reclamation of metal-mining areas could greatly enhance the prospects of using the fund as coal reclamations are concluded.

The Missouri state laws do not include funds for the reclamation of lands mined prior to the law. However, it does provide an avenue for receiving aid from the federal Abandoned Mine Reclamation Fund.

Federal Laws

I) Public Law 95-87 - August 3, 1977, Surface Mining Control & Reclamation Act of 1977.
Title IV - Abandoned Mine Reclamation

Sec. 409 - Filling voids and sealing tunnels.

- a) The Congress declares that voids, open and abandoned tunnels, shafts, and entryways resulting from any previous mining operation constitute a hazard to the public health or safety and that surface impacts of any underground or surface mining operation may degrade the environment. The Secretary, at the request of the Governor of any state, is authorized to fill such voids, seal such abandoned tunnels, shafts, and entryways and reclaim surface impacts of underground or surface mines which the Secretary determines could endanger life and property, constitute a hazard to the public health and safety, or degrade the environment. State regulatory authorities are authorized to carry out such work pursuant to an approved abandoned mine reclamation program.
- e) The Secretary may acquire by purchase, donation, easement, or otherwise, such interest in land as he determines necessary to carry out the provisions of this section.

Sec. 412 - Miscellaneous powers

- a) The Secretary of the State pursuant to an approved State program, shall have the power and authority, if not granted it otherwise, to engage in any work and to do all things necessary or expedient, including promulgation of rules and regulations, to implement and administer the provisions of this title.
- c) The Secretary of the State pursuant to an approved State program, may request the Attorney General, who is hereby authorized to initiate in addition to any other remedies provided for in this title, in any court of competent jurisdiction, an action in equity for an injunction to restrain any interference with the exercise of the right to enter or to conduct any work provided in this title.
- e) The Secretary may transfer funds to other appropriate Federal agencies, in order to carry out the reclamation activities authorized by this title.

II) Federal Register: Vol. 47, No. 126

Wednesday 6-30-82

Rules and Regulations

Part 875 - Non-Coal Reclamation

Authority: Secs. 409 and 412, Public Law 95-87

875.11 - Applicability

The provisions of this part apply to all reclamation projects on land or water affected by mining of minerals and materials other than coal and are to be carried out with money from the Fund and administered by a State or Indian

Tribe under an approved reclamation program according to Part 884 of this chapter.

875.12 - Eligible lands and waters

Non-coal lands and waters are eligible for reclamation if

- a) They were mined or affected by mining processes;
- b) They were mined prior to August 3, 1977, and left, or abandoned, in either unreclaimed, or inadequately reclaimed, condition;
- c) There is no continuing responsibility for reclamation by the operator, permittee, or agent of the permittee under statutes of the State or Federal Government;
- d) The reclamation has been requested by the Governor of the State or head of the Tribal body;
- e) The reclamation is necessary for the protection of the public health and safety, or all coal-related reclamation has been accomplished; and
- f) Money allocated to the State or Indian Tribe under 872.11 (b) (2) & (3) of this chapter are available for the work.

875.13 - Requirements for non-coal reclamation

Reclamation of eligible non-coal mined lands and waters shall comply with the provisions of Section 409 of Public Law 95-87.

Missouri State Laws

1) House Bill 459 - 80th General Assembly

The Strip Mine Law of 1979

Sec. 444.935 - The General Assembly declares that voids, open and abandoned tunnels, shafts, and entryways resulting from any previous mining operation constitute a hazard to the public health or safety, and that surface impacts of any underground or surface mining operation may degrade the environment. The Governor is authorized to request the appropriate federal officer under federal programs to fill such voids; seal such abandoned tunnels, shafts, and entryways; and reclaim surface impacts of underground mines which could endanger life and property, constitute a hazard to the public's health and safety, or degrade the environment. The commission is authorized to carry out such work pursuant to an approved abandoned mine reclamation program and with funds available for use in carrying out the purpose of this section from federal moneys received.

CONCLUSION

The hazardous conditions identified during this study have developed over many years. No easy solutions exist for these problems. Lack of government funds for reclamation adds to the dilemma. Individual efforts at safeguarding dangerous sites have been generally successful; however, the entire study area needs a comprehensive program of hazard control. The existence of 469 hazardous sites and the potential for future ground subsidences should provide strong incentive for such a program. Further neglect will only allow the present dangerous conditions to worsen.

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APPENDIX A:
TABULATIONS OF
MINE-RELATED HAZARDS

Table A-1 - OPEN MINE SHAFTS

Name	Site #	Location	Present Condition	Suggested Remedial Action
Overland Mine (east shaft)	27-32- 3-1	S2-NW-NE-NE Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open to unknown depth; owner reports water level is often at the surface; fencing and metal "DANGER" sign surround the opening.	Excellent access through open field provides good approach for heavy machinery. There is no fill material in vicinity - would have to be hauled in.
Double Eagle Mine	27-32- 3-2	SW-SE-SW-NE-NE Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, measures 3' x 5', and is wood-cribbed; wire fencing and metal "DANGER" sign provide a temporary safeguard; site is adjacent to MO-PAC railroad.	Shaft needs a more permanent closure. Chat piles on other side of RR provide ample fill material. Good access along RR for heavy machinery.
O. F. & L. Mine	27-32- 3-3	NE-NE-SW-NE Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, about 60' deep to water level, wood-cribbed 4' x 6' entrance; large fenced-off area (about 30 sq. ft.) encloses the shaft and concrete foundations.	Public access is limited; area owned and patrolled by Tri-State Motor Transit Co. However, shaft is very dangerous and should be closed more effectively. Ample chat nearby for fill material. Poor access for machinery.
Franklin Mine	27-32- 3-4	NW-SE-SW-NE Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, but filled nearly to surface with water, entrance is rock-walled and somewhat collapsing; area is enclosed by a 30 sq. ft. wire fence.	Public access is limited; area owned and patrolled by Tri-State Motor Transit Co. Shaft needs a more effective closure. Nearby chats would serve as fill material. Access is poor for heavy machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Roarke Diggings (west shaft)	27-32- 30-1	SE-SE-SE-SW-NE-SE Sec. 30-27N.-32W. Joplin East Quad Newton Co., Mo.	Small shaft with rock- walled sides, 30' deep.	Ample chat piles in the vicinity would provide back-fill for the open shaft.
Roarke Diggings (central shaft)	27-32- 30-2	SW-SW-SE-NE-SE Sec. 30-27N.-32W. Joplin East Quad Newton Co., Mo.	Small shaft with rock- walled sides, 20' deep.	Ample chat piles in the vicinity would provide back-fill for the open shaft.
Roarke Diggings (east shaft)	27-32- 30-3	SW-SW-SE-SE-NE-SE Sec. 30-27N.-32W. Joplin East Quad Newton Co., Mo.	Small shaft with rock- walled sides, 30' deep.	Ample chat piles in the vicinity would provide back-fill for the open shaft.
Roarke Diggings (open pit)	27-32- 30-4	SW-SW-SE-NE-SE Sec. 30-27N.-32W. Joplin East Quad Newton Co., Mo.	Large open pit, 100' long (north-south direction), 150' wide (east-west direc- tion), 20' deep, steep- sided walls in places.	Since land lots are being sold in this area, the open pit should be graded and smoothed out. Ample fill material in the vicinity.
Union Mine (west shaft)	28-32- 28-1	E2-SE-SE-SE Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and caving; 50' deep to a dry bottom; opening is 4' x 4', rock- walled, no cribbing visi- ble, very small tailings dump; thick foliage sur- rounds site; small waste pile adjacent to shaft.	Shaft could be filled with forest debris which is available nearby. Since there is a dry bottom to the shaft, back-filling would do an adequate job of closing the hazard.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Gibson Mine	28-32- 28-2	S2-N2-SE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft was originally 185' deep; is now 60' deep to water level, 4' x 6' cribbing is intact, large chat piles in area, and barbed wire fencing at one side of shaft. Opening is adjacent to a large natural sink-hole; hazard has limited access; is on private property with owner's home a short distance from shaft.	Since area is private property, access is limited; fencing and/or a wooden cover would serve as an adequate temporary closure. Ample boulders and chats are available for back-filling.
Nowata Mine	28-32- 28-3	NE-NE-SW-SE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft was originally 190' deep, now 50' deep to water level; opening is covered with a wood grate and surrounded by barbed wire, large chat piles. This shaft is a USGS water gauging station; has limited access; private property with owner's home a short distance from shaft area.	Concrete pad poured over the existing wood grate would serve as an effective seal. Plenty of fill material in vicinity; area is accessible to heavy machinery.
Ten O'Clock Mine (northeast shaft)	28-32- 28-4	SE-NE-NE-NE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, lined by steep piles of waste rock on north side, 3' x 3' cribbing intact; hazard easily accessible, no vegetation present.	Ample chat piles in area; could be used for back-filling. Opening is cribbed with wood and provides a crude base for laying a seal over shaft.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Ten O'Clock Mine (northwest shaft)	28-32- 28-5	C-W2-E2-NE-NE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open with 3' x 3' wood cribbing intact; located on NW slope of an open pit area.	Ample fill material lies near this shaft; fencing the area of the opening is also an option. Heavy machinery would have easy access to this site.
Nine O'Clock Mine (southeast shaft)	28-32- 28-6	SE-NW-NE-NE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open with a large tree growing out of edge of shaft; hidden by dense vegetation, open pits lie nearby, area is difficult to approach due to thick foliage.	Nearby chat piles could be used for fill material; dense vegetation could also add to the fill; large tree growing out of shaft could be used to wedge some large objects against and thus effect a seal.
Nine O'Clock Mine (southwest shaft)	28-32- 28-7	SW-NW-NE-NE-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, slightly vegetated around entrance, 3' x 3' cribbing intact; hazard is easily accessible, adjacent to jeep trail.	Site is approachable by earth-moving machinery; chat pile by shaft could be used for fill material. Fencing could also be easily accomplished.
Danglade Mine	28-32- 28-8	NW-SE-NE-NW-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft lies within a small thicket of trees, some collapse at top of opening, 5' x 5' wood-cribbed entrance, adjacent to concrete foundations and boulder/chat piles.	Some of the foundations may be wedged into the shaft to effect a closure. Fencing the entire foliated area around shaft could serve as a temporary safety precaution.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Milan Mine (Florine shaft)	28-32- 28-10	NE-SW-SE-NW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 201' deep, now 65' deep to water level, 3' x 5' wood cribbing remains but is quickly collapsing; site is somewhat foliated; large boulder and chat piles adjacent to shaft; hazard is easily accessible being adjacent to a jeep trail. This shaft is a USGS water gauging station.	The boulder piles in area could quickly back-fill this shaft - the collapsing cribbing may close this opening naturally. Fencing would be a temporary precaution since site is very accessible.
Milan Mine (west shaft)	28-32- 28-11	W2-W2-W2-SE-NW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open with 3' x 3' wood cribbing intact, 40' deep to water level; hazard is easily accessible being adjacent to jeep trail and miner's drainage canal; some foliage in area.	This shaft could be back-filled easily with nearby chats. Fencing would be a low-cost, temporary option. Lack of collapse at surface could make a wood or metal cover over top of cribbing another good option.
Jasper County Land & Mining Co. Mine (north shaft)	28-32- 28-12	N2-N2-SE-SW-NW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 132' deep, now 40' deep to water level, located on NW slope of a large open pit; opening is 3' x 3' and wood-cribbed, easily accessible via jeep roads.	Cribbing is intact to surface and no collapse evident - thus, a wood, metal or concrete cover, using the square cribbing as a base, would effect a good seal.
Goodrich Mine (east shaft)	28-32- 28-13	SE-SE-NE-NW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 175' deep, now 50' deep to water level, entrance lies in a foliated area alongside a large chat pile, wood-cribbed opening is in a state of minor collapse.	Plenty of chat for fill material nearby. Site is very accessible to heavy machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Goodrich Mine (west shaft)	28-32- 28-14	SW-SE-NE-NW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 175' deep, now 60' deep to water level, opening lies between large chat piles and vegetation, cribbed entrance has minor collapse.	Ample chats for back-filling; good access for heavy machinery.
Mt. Ararat Mine	28-32- 29-1	N2-SE-NE-NE Sec. 29-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 133' deep, now 40' deep to water level; opening is not visible due to dense vegetation and trees growing in and around shaft, some collapse is evident at opening.	Ample chat and boulders adjacent to shaft for back-filling. Area is marginally accessible to heavy machinery.
Mary C. Mine	28-32- 29-2	SW-SW-NE-SE-NE Sec. 29-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, 40' deep to water level, dense vegetation near opening; east-west fence line runs past shaft on north side, large chats lie on SE side.	Poor access to shaft area for heavy machinery. Ample fill material adjacent to site. Fencing not too practical around this shaft since loose waste rock is too close to opening.
St. Anthony Mine	28-32- 29-3	N2-NE-NE-SE Sec. 29-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft lies 100' SW of a shallow open pit, opening is slightly collapsed at surface and measures 3' x 3' at wood cribbing; some chats and boulders nearby.	Back-filling would probably be the best method for closure. Collapse around opening would not permit fencing to offer a long-term remedy. Ample fill material in area and good access exists for heavy machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Morrison Mine (southwest shaft)	28-32- 29-5	S2-S2-N2-NE Sec. 29-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 124' deep, now 40' deep to water level; located on NE slope of an open pit, jeep road passes by the opening on the north; barbed-wire fence on south side of shaft.	Fencing of shaft would be a low-cost safety measure; nearby chats are available for fill material. Access is good for earth-moving machinery.
New Hope Mine	28-32- 33-1	C-NE-NE-SE Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	20' diameter pool of water lies adjacent to large boulder pile; water is about 5-10' deep, shaft may be present near boulder pile.	Fencing and/or back-filling would be adequate safeguards; boulder pile adjacent to pool could serve as fill.
Owasso Mine	28-32- 33-2	SW-SW-NE-SE-SE Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and has caving sides, 40' deep to water level, opening is 4' x 6', wood-cribbed, and 20' below caved area.	Fencing would be a quick safeguard; back-filling recommended due to caving sides. Fill material not available in the immediate area.
What Cheer Mine (north shaft)	28-32- 33-3	C-NE-NW-NE Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 183' deep, now 40' deep to a dry bottom, wood-cribbed to the surface, opening measures 4' x 6', wire fencing surrounds this site.	Site is now fenced off; a large amount of fill material lies adjacent to the shaft and could be easily used for back-filling.
What Cheer Mine (southeast shaft)	28-32- 33-4	C-N2-S2-SE-NW-NE Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and 30' deep to water level, rock-walled sides are caving in, concrete foundations are also collapsing into the opening.	Heavy machinery could possibly push in the remaining concrete foundations to plug the opening; fencing may serve as a useful temporary measure.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Coahuila Mine (northwest shaft)	28-32- 33-5	SE-SW-NE-SW-NE Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and 50' deep to water level, present opening is quite small due to collapse - about 1 foot square. Shaft is rock-walled and caving badly.	Some more back-filling along with the natural collapse should close off this hazard.
Coahuila Mine (central shaft)	28-32- 33-6	C-W2-E2-W2-E2 Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and 80' deep to water level, badly collapsing ground adjacent to shaft, opening is 6 ft. square, pentagonal shape of wire-fencing surrounds the site.	Site is very dangerous despite the fencing; further safeguard is needed such as back-filling or plugging.
Gussie K. Mine (south shaft)	28-32- 33-7	SE-SW-SW-NE-SW Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Open pit with water measures 30' in diameter; shaft could possibly be open below the water. Area is presently protected by a tall wire fence completely surrounding the site; water depth is at least 20'; large chat piles are nearby.	Site is well protected at this time; however, a permanent solution should be proposed for the future, possibly draining the pit and then back-filling.
Melrose Mine (south workings)	28-32- 33-8	S2-NW-SE-SE-NW Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and 70' deep to water level, opening measures 4' x 6' and is wood-cribbed to the surface; metal fencing surrounds the site; large chat piles and concrete foundations are adjacent to the shaft.	This site is protected temporarily by the fencing; a further safeguard would be a metal or concrete cover, or plug, over the entrance.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Melrose Mine (north workings)	28-32- 33-9	E2-NE-NW-NE-NW Sec. 33-28N.-32W. Joplin East Quad Jasper Co., Mo.	Water-filled pit, 20' in diameter, lies 100' south of paved section-line road and adjacent to a boulder pile; shaft possibly open below the water.	Back-filling with the adjacent pile of boulders may be best procedure. Fencing would also be a good safeguard.
Marjorie Stewart Mine (north shaft)	28-32- 34-1	W2-SE-NW-NW-NE Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft area is somewhat foliated and strewn with debris and junk, opening is 30' deep to water level.	Ample back-fill material near this site. Very good access for heavy machinery. Fencing is another option since collapse near the shaft is not evident.
Alabama Mine (east shaft)	28-32- 34-2	SE-SE-SE-NE-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is fenced but west side of the fencing is deteriorating.	Shaft has temporary safety measures at this time. Independent Gravel Co. controls this area and private access is limited.
Alabama Mine (west shaft)	28-32- 34-3	SW-SE-SE-NE-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Railroad rails and concrete slabs are lying over the opening and form a temporary closure.	Shaft has temporary safety measures at this time. Independent Gravel Co. controls this area and private access is limited.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Hyde Park Mine	28-32-34-4	SW-SW-SW-SE Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, originally 209', now 70' deep to water level; shaft was used as a USGS water gauging station; shaft lies just south of large chat pile which is being quickly removed by Independent Gravel Co. for reprocessing. Opening is covered with steel plates that are securely welded together and attached to a concrete collar surrounding shaft.	Steel cover serves as a good protective closure; fencing would be an excellent additional measure.
Trinity Mine (south shaft)	28-32-34-5	W2-NE-SE-SE-SW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, has caving sides, 20' deep to water level, area is wire-fenced, hole is rock-walled, opening at surface is 20' in diameter.	Ample chats nearby could be used for back-filling; some sturdier fencing would be a temporary safeguard as well as warning signs being posted.
Trinity Mine (north shaft)	28-32-34-6	SW-SE-NE-SE-SW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, has caving sides, 20' deep to water level, area is wire-fenced, hole is rock-walled, opening at surface is 20' in diameter.	Ample chats nearby could be used for back-filling; some sturdier fencing would be a temporary safeguard as well as warning signs being posted.
Coronation Mine	28-32-34-7	SW-SE-NW-NW-SW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open; some collapse around shaft with concrete foundations falling slowly into it.	Ample chat piles in area for use as back-fill material. Excellent access for earth moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Fidelity Mine	28-32-34-8	C-S2-SE-SW-SW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is well-hidden amidst a dense thicket of foliage at the NW end of a huge chat pile; opening is collapsed at surface to 15' diameter, 4' x 6' wood cribbing visible 20' below surface.	Huge chat pile lies adjacent to shaft site. Back-filling would be a good corrective measure since access is excellent for the necessary heavy machinery.
Thanksgiving Mine (south shaft)	28-32-34-9	N2-NE-NE-SW-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is well-hidden, lying within a thicket of trees adjacent to gravel road, opening is collapsing, 10' diameter at surface.	Shaft is near road and could be fenced and/or filled easily if the trees in the area were removed.
Thanksgiving Mine (central shaft)	28-32-34-10	S2-SE-SE-NW-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	6' x 6' wood cribbing remains intact to the surface, shaft is 50' deep to water level.	Shaft has a huge chat pile adjacent to it; wood cribbing provides a base for a metal or wood cover for sealing; fencing would also be a good option in this case. Access is good for any type of machinery.
Appleknocker Mine (south shaft)	28-32-34-11	NE-NW-SW-SW-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open and rock-walled with some caving near the surface; originally 185' deep, now 50' deep to water level; shaft opening is well-hidden due to thick vegetation.	Plenty of boulder-size rock lies immediately south of shaft. Access for heavy vehicles to back-fill is marginal.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Appleknocker Mine (north shaft)	28-32- 34-12	SE-SW-NW-SW-NW Sec. 34-28N.-32W. Joplin East Quad Jasper Co., Mo.	Open shaft is well-hidden although near main road; 3' x 7' cribbed opening is slightly collapsed at surface; about 60' deep to water level.	Boulder pile just north of shaft can be utilized for fill material. Good access for heavy earth- moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Underroof Mine	27-33-4-1	NE-NW-SE-NE-NE Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, filled with water, junk metal and debris. Chat flats in area.	Back-filling recommended; fill material would have to be hauled in; good access for heavy machinery.
Condor Mine	27-33-4-3	C-E2-E2-NE-NW-NW Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, 5' to water level; floating vegetation in shaft. Chat and boulders remain.	Ample chats in vicinity for back-filling purposes.
Portland Mine	27-33-4-4	E2-NE-NE-NW-NW Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 15' in diameter, water-filled. Concrete foundations drifting toward shaft.	Old foundations and nearby chats would provide back-fill material.
Baltimore Mine	27-33-4-6	E2-SE-NW-NW-NW Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 25' in diameter, very steep, loose near opening, 20' deep to water level.	Boulder and chat piles in area can be used for back-filling.
Ramage Mine (east shaft)	27-33-5-2	C-W2-W2-SE-NW-SW Sec. 5-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 30' diameter pool of water within a caving pit, adjacent to chat/boulder piles.	Large chat/boulder piles at site should provide plenty of back-fill material.
Ramage Mine (west shaft)	27-33-5-3	C-SW-NW-SW Sec. 5-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 20' diameter pool of water within a caving pit; shaft possibly open below water.	Large chat/boulder piles at site should provide plenty of back-fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Rebecca Mine	27-33-5-4	S2-SE-SW-NW-NW Sec. 5-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open and 2' square at water level, which is 15' below surface; opening is 20' in diameter at surface and sides are caving down to the water level.	Ample chats are available at this site for back-filling purposes.
Coyote Mine (northwest shaft)	27-33-6-1	NE-SW-SW-NE-NE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open and water-filled to the surface, rock-walled, opening is 6' square. Some barbed wire surrounds shaft.	Suggest some cyclone fencing be installed to replace the barbed wire. Back-fill chats are in the vicinity.
Coyote Mine (southeast shaft)	27-33-6-2	SE-SW-NE-NE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open and water-filled to the surface, rock-walled, opening is 6' square. Some barbed wire surrounds shaft.	Suggest some cyclone fencing be installed to replace the barbed wire. Back-fill chats are in the vicinity.
Airdale Mine (north shaft)	27-33-6-3	SE-NW-NE-SE-NE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, wood-cribbed 4' x 6' hole, water-filled, fenced with barbed wire.	Recommend better fencing be installed. Back-fill material is available at the site.
Airdale Mine (central shaft)	27-33-6-4	NW-SW-NE-SE-NE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, wood-cribbed 4' x 6' hole, water-filled, fenced with barbed wire.	Recommend better fencing be installed. Back-fill material is available at the site.
Airdale Mine (south shaft)	27-33-6-5	C-SE-NE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is probably open below a 15' diameter pool of water. Adjacent to a small chat pile.	Recommend better fencing be installed. Back-fill material is available at the site.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Gibson Mine (north shaft)	27-33- 6-6	C-NW-NE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is probably open below a 10' diameter pool of water.	Back-fill chats are in area; chain-link fencing and warning signs also suggested.
Gibson Mine (south shaft)	27-33- 6-7	SE-SE-NW-NE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 6' x 8' wood-cribbed hole has a concrete collar at the surface, opening is 15' deep to water level.	Back-fill chats are in area; chain-link fencing and warning signs also suggested.
Once More Mine (north shaft)	27-33- 6-8	S2-NE-SE-NE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open below 20' diameter pool of water.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Once More Mine (south shaft)	27-33- 6-9	NE-SE-SE-NE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open below 20' diameter pool of water.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
A.W.C. #1 Mine (east shaft)	27-33- 6-10	NE-SE-SW-SE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is plugged with fill but appears ready to re- open, opening is 20' in diameter at surface and drops 25' to the plug.	Ample chats in area could be used for back-filling.
A.W.C. #1 Mine (west shaft)	27-33- 6-11	SE-NW-SW-SE-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open and caving down to 30' below the surface where some rotten cribbing (4' x 6') is visible; shaft is 40' deep to water level.	Ample chats in area could be used for back-filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
A.W.C. #3 Mine	27-33-6-12	SW-NE-SE-SW-SE Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open and caving at surface, 30' deep to water level, concrete pillars drifting into surface hole which is 15' in diameter.	Plenty of chat in area to use as back-fill.
Ben B. Mine	27-33-6-13	N2-NE-SW-SE-SW Sec. 6-27N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 8' diameter concrete collar surrounds hole but is about to cave in, opening is 15' deep to water level, some barbed wire fencing is present.	Suggest back-filling since area is collapsing. Fencing is presently being consumed by hole.
Monkey Hill Mine (east shaft)	27-33-19-2	W2-NW-SE-SE-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	3' x 3' wood-cribbed opening, cribbing is rotted; 30' deep to water level.	Fencing or back-filling would be both quick and inexpensive.
Monkey Hill Mine (west shaft)	27-33-19-3	NE-NE-SW-SE-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	3' x 3' wood-cribbed opening, cribbing is rotted; 30' deep to water level.	Fencing or back-filling would be both quick and inexpensive.
Puritan Mine (south shaft)	27-33-19-4	NE-NW-NW-NW-SE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	Open shaft is caving and quite unstable despite its rock walls; 40' deep and dry-bottomed.	Ample back-fill material in the area. Good access for earth-moving machinery.
Puritan Mine (north shaft)	27-33-19-5	NE-SW-SW-SW-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	Open shaft is caving and quite unstable despite its rock walls; 40' deep and dry-bottomed.	Ample back-fill material in the area. Good access for earth-moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Unknown	27-33-19-6	W2-NE-SW-SW-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft runs under the road, has collapsed and is 30' deep to water level; shaft has produced a natural bridge and is wet.	Back-fill material in area, road is soon to collapse due to the adjacent shafts; thus, back-filling would be the best corrective action.
Unknown	27-33-19-7	NE-NW-SW-SW-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open, easily accessible, and walk-in; dry and associated with a 10' drift.	Back-fill material in area, road is soon to collapse due to the adjacent shafts; thus, back-filling would be the best corrective action.
Unknown	27-33-19-8	E2-SW-NW-SW-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	Several uncribbed prospect shafts, rock-walled, ranging from 15-40' in depth; shafts are located along a valley side in Roaring Springs Hollow.	Access is limited to this area, dirt roads have locked gates at their entrances, and fencing and signs would be an expensive precaution.
Hutchinson Mine	27-33-20-2	C-W2-W2-NE-NE-SE Sec. 20-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open and 30' deep to a dry bottom, probably associated with the adjacent subsidence pit.	Two well-travelled roads are adjacent to this hazard. High-priority hazard! Suggest hauling in fill material to close the shaft.
Mystic Shaft	27-33-20-3	NW-SW-SE-SW-SW Sec. 20-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled and roughly 10' in diameter, slowly caving in at the surface; shaft is 20' deep to water level and within 10' of creek level; small waste pile at south edge of shaft.	Site is private and access is controlled. Fencing and a danger sign would probably be an effective safeguard.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Unknown	27-33-20-4	C-S2-NW-NW-NW-SW Sec. 20-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open; 3' x 3', wood-cribbed, water-filled to the surface; cribbing is intact and water is level with top of crib.	Since the cribbing is intact to the surface, a concrete pad could close off this hole easily. Also, there is plenty of back-fill material in the area.
Riverside Mine (central shaft)	27-33-29-1	E2-E2-W2-NE-SW Sec. 29-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open and wide-mouthed; lies within 100' of busy highway; opening is well-hidden among the old concrete foundations and timber debris, as well as the normally thick vegetation. There is a concrete collar around the top of the opening which has been undercut by the collapse.	This shaft could be sealed at the top with a concrete plug, or a gridwork of metal or wood. It would have a solid base on top of the concrete collar already surrounding the opening. The timber scattered around this site could be cleaned up with a small effort.
Riverside Mine (west shaft)	27-33-29-2	C-NE-SE-NW-SW Sec. 29-27N.-33W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, and water-filled to within 25' of surface, hole is caving from the water level to the surface where it is 30' in diameter, sides are funnel-shape and collapsing.	Shaft is only 100' south of busy road and access is easy. Fencing and danger sign would be a quick initial safeguard.
Happy Rock Mine	27-34-2-1	SW-SW-SW-SE-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open with caving sides dropping 10' to water level, area is fenced with barbed wire.	New fencing needed or back-filling with adjacent chats.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Kramer #1 Mine	27-34- 2-4	E2-SE-NW-SW-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open and 60' deep to water level; opening is 15' x 15' and very steep-sided; site is fenced with barbed wire.	Area is controlled by Farmer's Chemical Co. and, thus, new and better fencing would serve as an effective safeguard. In the future, back-filling would be recommended.
Kramer #2 Mine	27-34- 2-5	SE-NW-NW-SW-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open and 15' deep to water level, sides are caving in and area is fenced with barbed wire, large subsidence pits are located nearby.	This site will probably coalesce with the adjacent subsidence pit in the near future. Posting danger signs would be a temporary safeguard. Area is controlled by Farmer's Chemical Co.
Kramer Incline Mine	27-34- 2-6	C-SE-SW-NW-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open and 20' deep to a choked bottom; sides are caving and residuum forms most of the choked area; some barbed wire fencing surrounds the pit.	Further back-filling would be a primary step to safeguard the site; some new fencing also suggested. Area is controlled by Farmer's Chemical Co.
Unknown	27-34- 2-7	C-E2-NW-SW-SW Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open and 30' deep to water level, wood-cribbing intact, concrete foundations remain in area.	Nearby chats available for back-filling purposes.
Unknown	27-34- 2-8	E2-NE-NW-SW-SW Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 40' deep to water level, sides are caving.	Chat piles are nearby to use as fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Mattes Bros. Mine (west shaft)	27-34- 24-1	C-SE-NE-SE-NE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, 60' deep to water level, opening is wood-cribbed to the surface and measures 8' x 12'. Mining structures remain at shaft site; chat piles and "chat flats" nearby.	This shaft could easily be fenced for safety. Access is limited due to private residence nearby.
Adams - Hicks Mine (north shaft)	27-34- 24-2	S2-SW-SE-SE-NE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, wood- cribbed but caving at surface, water level is 60' below surface and 40' below top of crib; large chat and boulder piles in vicinity.	Ample chats available in area for back-filling. Fencing not suggested since area is collapsing around the shafts.
Adams - Hicks Mine (south shaft)	27-34- 24-3	C-NW-NE-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, wood- cribbed but caving at surface, water level is 60' below surface and 40' below top of crib; large chat and boulder piles in vicinity.	Ample chats available in area for back-filling. Fencing not suggested since area is collapsing around the shafts.
Gimlet Mine (north shaft)	27-34- 24-4	SW-SW-NE-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample chats are available for back-fill material. Posting danger signs would also be a good safe- guard.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Gimlet Mine (north-central shaft)	27-34- 24-5	N2-NW-SE-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample charts are available for back-fill material. Posting danger signs would also be a good safeguard.
Gimlet Mine (east-central shaft)	27-34- 24-6	SW-NW-SE-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample charts are available for back-fill material. Posting danger signs would also be a good safeguard.
Gimlet Mine (west-central shaft)	27-34- 24-7	SE-NE-SW-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample charts are available for back-fill material. Posting danger signs would also be a good safeguard.
Gimlet Mine (southwest shaft)	27-34- 24-9	C-N2-SE-SW-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample charts are available for back-fill material. Posting danger signs would also be a good safeguard.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Gimlet Mine (south shaft)	27-34- 24-10	C-S2-S2-S2-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample chats are available for back-fill material. Posting danger signs would also be a good safeguard.
Gimlet Mine (southeast shaft)	27-34- 24-12	S2-SW-SE-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	Shaft is open, rock-walled, collapsing, and 30' deep to water level.	Access is controlled to this area due to private property; however, ample chats are available for back-fill material. Posting danger signs would also be a good safeguard.
Cock Robin Mine	28-33- 32-1	SW-SW-NW-NE-SE Sec. 32-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, artesian; shaft area is foliated. Chat and boulder piles remain.	Cyclone fencing, posting "DANGER" signs, and back- filling is recommended.
Nickolsville Mine	28-33- 32-2	C-E2-E2-SE-NW-SE Sec. 32-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, 12' deep to water level; concrete foundations are being undercut by sloughing. Boulder and chat piles remain.	Nearby chat piles can be used for back-fill material.
Chicago Consolidated Mine (north shaft)	28-33- 32-3	C-W2-W2-SW-SW-NE-SE Sec. 32-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, fenced, 12' in diameter, water- filled to top; fences sloughed.	Nearby chat piles can be used for back-fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Chicago Consolidated Mine (south shaft)	28-33-32-4	SE-SE-SE-NW-SE Sec. 32-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, unfenced, 10' square, water-filled to top. Boulders and chat piles remain.	Cyclone fencing, posting "DANGER" signs, and back-filling is recommended.
Lola Mine	28-33-33-1	S2-NW-SE-SE-SE Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, caving, now 20' diameter, 8' deep to water level. Boulders, chat piles and concrete foundations remain.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
Amblon Mine	28-33-33-2	W2-SE-SE-SE-SE Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, caved, partially clogged with trash and metal, 10' deep to water level. Boulders and chat piles very near houses and used as a play area by children.	High-priority hazard! Nearby chat piles can be used for back-fill material.
Omega Mine (east shaft)	28-33-33-3	C-W2-E2-SW-SE-SW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 5' x 3' hole in bottom of caving area 50' in diameter, 20' deep, water 5' below base of hole opening.	Nearby chat piles can be used for back-fill material.
Omega Mine (west shaft)	28-33-33-4	W2-SW-SE-SE-SW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 9' in diameter, 5' deep to water level, edges caving. Boulders, chat piles and concrete foundations remain.	Nearby chat piles can be used for back-fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Crackerjack Mine	28-33-33-5	SW-NE-SE-SW-SW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, artesian. Boulders and chat piles remain.	Cyclone fencing, posting "DANGER" signs, and back-filling is recommended.
Pralin Mine	28-33-33-6	C-W2-SW-SW-SE-NW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 15' x 25', 12' deep to water level, concrete collar undercut by sloughing and collapse. Boulders and chat piles remain.	Nearby chat piles can be used for back-fill material.
McBride Mine	28-33-33-8	NE-NW-SW-SE-NW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 6' x 12', concrete collar intact, was originally 90' deep, now 6' deep to water. Boulders, chat piles and concrete foundations remain in area.	Cyclone fencing, posting "DANGER" signs, and back-filling is recommended.
Trimore Mine	28-33-33-9	SE-SE-NW-SE-NW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	Shaft is open, 15' diameter, originally 100' deep, now 10' deep to water, sloughing beneath concrete collar. Boulders, chat piles and concrete foundations remain.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Chicago Lehigh Mine (shaft #1)	28-33- 7-1	C-W2-NW-NE-SW-NE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, sides are caving in, 10' deep to water level.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Chicago Lehigh Mine (shaft #2)	28-33- 7-2	SE-NW-NE-SW-NE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, sides are caving down to 8' diameter hole, water level is at 12' depth.	Nearby chat and boulder piles can be used for back-fill material.
Chicago Lehigh Mine (shaft #3)	28-33- 7-3	NW-SW-NE-SW-NE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and caving, 5' x 5' cribbing in hole, 15' deep to water level.	Cyclone fencing, posting "DANGER" signs, and back- filling is recommended.
Chicago Lehigh Mine (shaft #4)	28-33- 7-4	W2-SE-SE-SW-NE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, con- crete is collapsing into hole, water level is at 15' depth.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.
Chicago Lehigh Mine (shaft #5)	28-33- 7-5	NW-NE-NE-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 8' in diameter at surface, hole is water-filled.	Ample fill material in vicinity; good access for heavy earth-moving ma- chinery.
Bryant Mine	28-33- 7-6	SE-NE-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 15' in diameter, 10' deep to water level.	Nearby chat and boulder piles can be used for back-fill material.
Great Northern Mine	28-33- 7-8	NW-NW-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 12' in diameter, 5' deep to water level; chat and boulder piles remain, surface diggings evident.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
United Zinc Mine (east shaft)	28-33- 7-11	NE-SW-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, water-filled; chat piles and concrete foundations remain. Sur- face diggings evident.	Nearby chat and boulder piles can be used for back-fill material.
United Zinc Mine (west shaft)	28-33- 7-13	SE-SE-SE-NE-NE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, water-filled; chat piles and concrete foundations remain. Sur- face diggings evident.	Nearby chat and boulder piles can be used for back-fill material.
Lehigh Mine (northeast shaft)	28-33- 7-14	SE-SE-SE-NE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 8' - 12' diameter, caving, water-filled.	Ample fill material in vicinity; good access for heavy earth-moving ma- chinery.
Lehigh Mine (north-central shaft)	28-33- 7-15	SW-SE-SE-NE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 8' - 12' diameter, caving, water-filled.	Ample fill material in vicinity; good access for heavy earth-moving ma- chinery.
Lehigh Mine (southeast shaft)	28-33- 7-16	C-W2-NE-NE-SE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 8' - 12' diameter, caving, water-filled.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Lehigh Mine (south-central shaft)	28-33- 7-18	NW-NW-NW-NE-SE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, caving, funnels to 4' in diameter, 10' deep to water level.	Nearby chat and boulder piles can be used for back-fill material.
Lehigh Mine (southwest shaft)	28-33- 7-19	SE-NE-NW-SE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 5' square, vertical 10' to water.	Cyclone fencing, posting "DANGER" signs, and back-filling is recom- mended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Lehigh Mine (northwest shaft)	28-33- 7-21	N2-NE-SE-NW-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, water-filled.	Ample fill material in vicinity; good access for heavy earth-moving ma- chinery.
Texas Bull Mine	28-33- 17-2	NW-SW-NE-SE-NW Sec. 17-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 20' in diameter, originally 153' deep, now 15' deep to water level; foundations are under- cut by sloughing. Chat and boulder piles remain.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
Sitting Bull Mine (north shaft)	28-33- 21-1	NW-NW-NW-NE-NE Sec. 21-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 18' in diameter, originally 185' deep, water- filled; also filled with junk and brush. Chat piles, concrete foundations and boulders remain.	Nearby chat and boulder piles can be used for back-fill material.
Sitting Bull Mine (south shaft)	28-33- 21-2	C-W2-W2-NW-NE-NE Sec. 21-28N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 15' in diameter, originally 185' deep, water- filled; also filled with junk and brush. Chat piles, concrete foundations and boulders remain.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Isherwood Mine	28-34- 12-2	C-SE-NW-SW-NW Sec. 12-28N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 8' square, concrete collar caving, 10' deep to water level. Debris and trees pushed into entrance.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
Indiana Mine (shaft #1)	29-33- 18-1	C-W2-E2-E2-SE Sec. 18-29N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 8' square, concrete collar caving, wood-cribbed, 4' x 4', 12' deep to water level.	Cyclone fencing, posting "DANGER" signs, and back-filling is recommended.
Indiana Mine (shaft #2)	29-33- 18-2	SW-SW-SE-NE-SE Sec. 18-29N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 15' in diameter, caving, 6' square, 12' deep to water level.	Nearby chat and boulder piles can be used for back-filling.
Indiana Mine (shaft #3)	29-33- 18-4	C-S2-S2-S2-NE-SE Sec. 18-29N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 4' square hole, covered with timber and concrete, 12' deep to water level.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
Indiana Mine (shaft #4)	29-33- 18-5	SE-SE-SW-NE-SE Sec. 18-29N.-33W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 12' in diameter, caving, 4' diameter 8' below (at water level).	Nearby chat and boulder piles can be used for back-fill material.
Pyramid Mine (north shaft)	29-34- 14-1	SE-SW-SE-SW-SE Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 20' in diameter, filled with brown stagnant water. Surface diggings and boulders remain.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Allegheny-Western Mine (north shaft)	29-34- 14-2	C-S2-SW-SW-SW-SE Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 12' in diameter, originally 200' deep, now water-filled; contains dead animals, boulders remain.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Blue Rock Mine	29-34-14-5	NE-SW-NE-SE-SW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 15' in diameter, water-filled, boulders remain.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Gascho Mine (north shaft)	29-34-14-8	SW-NE-SW-SE-NW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 20' in diameter, sloughing.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Gascho Mine (south shaft)	29-34-14-9	NW-SE-SW-SE-NW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 12' in diameter, located between subsidence and concrete foundations, sloughing, 15' deep to water level.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
Freehold #2 Mine	29-34-14-10	NE-NW-SW-SW-SW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 6' square, 15' deep to water level.	Nearby chat and boulder piles can be used for back-fill material.
St. Louis Smelting & Refining Mine	29-34-15-1	S2-SW-NE-SE-NE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 12' in diameter, 6' to water level, concrete caving and sloughing.	All mining waste (boulders, chats, concrete) in area can be used for back-filling.
High Five Mine (east shaft)	29-34-15-3	SW-SE-SE-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open and 10' in diameter, water-filled, sloughing, coalesced with subsidence to north.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
High Five Mine (west shaft)	29-34-15-6	C-E2-SW-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' x 12', water-filled, concrete collar undercut by sloughing.	Ample fill material in vicinity; good access for heavy earth-moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Barnsdall #2 Mine (north shaft)	29-34- 22-1	S2-NE-NW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open; northeast of long subsidence, 15' in diameter, water- filled.	Nearby chat and boulder piles can be used for back-fill material.
Barnsdall #2 Mine (northwest shaft)	29-34- 22-2	NE-SW-NW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open; northwest of long subsidence, 15' in diameter, water-filled.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.
Barnsdall #2 Mine (west shaft)	29-34- 22-4	NW-NE-SW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open; west of long subsidence, 15' in diameter, water-filled.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Goodyear Mine (northeast shaft)	29-34- 22-7	C-N2-SW-SE-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is collapsed with concrete and boulders sloughing, 15' deep, water in bottom.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.
Goodyear Mine (northwest shaft)	29-34- 22-9	NW-NW-NE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, cribbed, 4' x 4', cave to 10' diameter, 20' deep to water level.	Cyclone fencing, posting "DANGER" signs, and back-filling is recom- mended.
Goodyear Mine (southeast shaft)	29-34- 22-12	SW-SE-NE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 3' in diameter, water-filled.	Nearby chat and boulder piles can be used for back-fill material.
Goodyear Mine (southwest shaft)	29-34- 22-14	C-E2-SW-NE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, filled with water, junk and debris.	Ample fill material in vicinity; good access for heavy earth-moving ma- chinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Barnsdall #2 Mine (south shaft)	29-34- 22-16	W2-SE-NW-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 6' in diameter, water-filled.	Nearby chat and boulder piles can be used for back-fill material.
Pyramid Mine (south shaft)	29-34- 23-1	C-N2-NE-NW-NE Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, water-filled, artesian.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Allegheny-Western Mine (central shaft)	29-34- 23-3	NE-NE-NW-NW-NE Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, pool, artesian, brown water. Boulders, chat flats, and concrete foundations remain.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.
Allegheny-Western Mine (south shaft)	29-34- 23-5	C-N2-SE-NW-NW-NE Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, 6' deep to water level, partially junk-filled. Boulders, chat flats, and concrete foundations remain.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Freehold #3 Mine (northeast shaft)	29-34- 23-6	N2-NE-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 8' in diameter, artesian, brown water. Concrete founda- tions, chat flats, and boulders remain.	Nearby chat and boulder piles can be used for back-fill material.
Freehold #3 Mine (northwest shaft)	29-34- 23-8	NW-NW-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 12' in diameter, water-filled, coalesced with west subsidence. Concrete foundations, chat flats, and boulders remain.	All mining waste (boulders, chats, concrete) in area can be used for back- filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Freehold #3 Mine (west shaft)	29-34- 23-10	SW-NW-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 25' in diameter, water-filled, caving. Concrete foundations, chat flats, and boulders remain.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Freehold #3 Mine (southwest shaft)	29-34- 23-11	NW-SW-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, water-filled. Concrete foundations, chat flats, and boulders remain.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Tulsa-Pittsburg #1 Mine (north shaft)	29-34- 23-12	SW-NW-NW-SE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, 6' deep to water level, Pennsylvanian shales caving into hole. Chat flats and boulders remain.	Nearby chat and boulder piles can be used for back-fill material.
Tulsa-Pittsburg #1 Mine (south shaft)	29-34- 23-13	NW-NW-SW-SE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 20' in diameter, water-filled, Pennsylvanian shales caving into hole. Chat flats and boulders remain.	Ample fill material in vicinity; good access for heavy earth-moving machinery.
Tulsa-Pittsburg #1 Mine (central shaft)	29-34- 23-15	C-SE-NE-SW-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 10' in diameter, 6' deep to water level, Pennsylvanian shales sloughing into hole. Chat flats and boulders remain.	Nearby chat and boulder piles can be used for back-fill material.
Tulsa-Pittsburg #1 Mine (west shaft)	29-34- 23-16	W2-SE-NE-SW-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	Shaft is open, 6' in diameter, 10' deep to water level, Pennsylvanian shales visible in sides of hole. Chat flats and boulders remain.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Golden Glow Mine	28-32-6-1	SE-NW-NE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and caving, 20' in diameter, hole is water-filled.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
American Beauty Mine	28-32-6-2	NW-NE-SE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Incline shaft is open, 10' X 20' hole has concrete, vertical sides with an approximate 45° incline, 30' deep to water level and trash, concrete collar is intact.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Yellow Dog Mine (north shaft)	28-32-6-3	C-NW-NE-SE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Incline shaft is 20' deep to trash fill, 10' X 20' opening has concrete, vertical sides with an approximate 45° incline, concrete collar is intact.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Yellow Dog Mine (south shaft)	28-32-6-4	SE-SW-NE-SE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Opening is 20' in diameter and 12' deep to unstable fill of boulders and concrete foundations, concrete collar is collapsed.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Red Dog Mine (north workings)	28-32-6-6	SE-NE-SW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving concrete collar, 80' deep to water level, boulders sloughing into hole from west side.	Chat/boulder piles in the vicinity could be used for back-filling purposes.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
After Glow Mine (south shaft)	28-32- 6-7	C-N2-NW-SE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and measures 15' in diameter at surface, caving concrete collar, 50' deep to water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
After Glow Mine (north shaft)	28-32- 6-8	C-N2-S2-N2-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and caving at surface, 30' in diameter, hole is water-filled.	Ample fill material in vicinity, good access for heavy earth-moving machinery.
Bull Dog Mine (east shaft)	28-32- 6-9	SW-NE-SW-SW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 15' in diameter and 30' deep to water level, concrete collar is caving and is badly undercutting boulder pile at east side.	Steep, caving sides make fencing a temporary safeguard; back-filling is recommended.
Bull Dog Mine (west shaft)	28-32- 6-10	NE-SW-SW-SW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is 40' in diameter with steep, caving sides, 25' deep to trash fill.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Church & Company Mine (south shaft)	28-32- 6-11	NW-NW-NE-SW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 15' in diameter at surface, thick vegetation near opening, hole is water-filled.	Chat/ boulder piles in the vicinity could be used for back-filling purposes.
Church & Company Mine (east shaft)	28-32- 6-12	SE-SW-SE-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' in diameter, water-filled, thick vegetation near hole.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Church & Company Mine (central shaft)	28-32- 6-13	E2-SE-SW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, water-filled to surface, 4' X 4' wood-cribbing visible below water.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Church & Company Mine (north shaft)	28-32- 6-14	C-SW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 10' X 20' concrete collar is intact, double compartment opening is undercut on north and west sides, floating vegetation in shaft.	Ample fill material in vicinity, good access for heavy earth-moving machinery.
Church & Company Mine (west shaft)	28-32- 6-15	C-W2-SW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 6' in diameter, water-filled to surface, floating vegetation in shaft.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Parker Mine (east shaft)	28-32- 6-17	W2-SW-NE-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 10' in diameter, floating vegetation in shaft.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Parker Mine (south shaft)	28-32- 6-18	NW-NE-SW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 10' in diameter, coalesced with adjacent subsidence pool.	Ample fill material in vicinity, good access for heavy, earth-moving machinery.
Parker Mine (south-central shaft)	28-32- 6-19	C-S2-S2-NW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled at surface, 20' in diameter.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Parker Mine (central shaft)	28-32- 6-20	C-S2-NW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' in diameter, water-filled to surface, floating vegetation in shaft.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Parker Mine (north-central shaft)	28-32- 6-21	SW-NE-NW-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 10' in diameter, floating vegetation in shaft.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Parker Mine (north shaft)	28-32- 6-22	SW-SE-SW-SW-NW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and caving at surface, 10' in diameter opening descends to 4' X 4' hole which is water-filled.	Steep, caving sides make fencing a temporary safeguard; nearby waste-rock can be used for back-filling purposes.
Richvale Mine	28-32- 6-23	C-E2-W2-E2-W2-W2 Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter, concrete collar is caving at surface and sloughing into shaft, 10' deep to water level, floating vegetation in shaft which will soon coalesce with adjacent subsidence pool.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Premier Mine (north shaft)	28-32- 7-1	SE-NW-NW-NE-SE Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' X 10' concrete collar is intact, 5' X 7' rock-walled shaft begins 6' below collar, 60' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs also suggested.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Premier Mine (south shaft)	28-32- 7-2	E2-SW-NW-NE-SE Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 25' in diameter at surface, concrete collar is caving into 6' X 6' rock-walled shaft, 40' deep to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling is recommended.
Media Mine (north shaft)	28-32- 7-3	NW-SE-NW-SW-NE Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 6' X 10' concrete collar is intact, hole is rock-walled and 80' deep to trash fill.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Media Mine (south shaft)	28-32- 7-4	C-S2-SW-SW-NE Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, 4' X 6' concrete collar is collapsing into hole, 15' deep to chat/concrete fill.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Mercantile #4 Mine	28-32- 7-5	NW-SW-NE-SE-SW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, 6' X 6' rock-walled shaft descends 30' to dry bottom.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Electrical Mine	28-32- 7-7	NE-SW-SE-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Incline shaft is open and measures 6' X 10' with an approximate 40° incline, surface opening is 20' in diameter with caving sides, concrete roof above incline is also collapsing, depth to water level is 25' along incline angle.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is good for heavy, earth-moving machinery.
Mineral King Mine	28-32- 7-8	NE-NE-SW-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and caving at surface, 4' X 4' concrete collar is also collapsing, 50' deep to water level.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Hurry Up Mine	28-32-7-9	W2-SE-SW-NE-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open with concrete collar intact, 5' X 7' opening is wood-cribbed to a depth of 40' to a trash fill.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Ground Floor Mine (southeast shaft)	28-32-7-10	E2-NE-SE-NE-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is 30' in diameter at surface, caving concrete collar, 20' deep to fill of boulders and concrete foundations.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Ground Floor Mine (northwest shaft)	28-32-7-11	NW-SE-NW-NE-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 30' in diameter at surface, concrete collar is caving, 15' deep to 6' X 10' rock-walled shaft, 60' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Red Dog Mine (south workings)	28-32-7-12	W2-NW-NW-NE-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 20' in diameter at surface, concrete collar is caving, 15' deep to rock-walled shaft, 60' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Providence Mine	28-32-7-13	C-W2-W2-SW-NW-NW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 25' in diameter at surface, 15' deep to 8'-diameter rock-walled shaft, 20' deep to water level, shaft sides are composed of unstable shales and soils.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Chapman Land Company Mine (east shaft)	28-32-8-1	C-E2-E2-W2-NE-SW Sec. 8-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 7' concrete collar is intact, double compartment hole is water-filled.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Chapman Land Company Mine (west shaft)	28-32-8-2	SW-SE-NW-NE-SW Sec. 8-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' concrete collar is intact, hole is water-filled, dense vegetation in area.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Sunflower Mine (north shaft)	28-32-8-3	SE-NE-SW-SE-SW Sec. 8-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled, 12' in diameter at surface, concrete collar is visible below water.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Sunflower Mine (south shaft)	28-32-8-4	E2-SE-SW-SE-SW Sec. 8-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled, 10' in diameter at surface, concrete collar is visible below water.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Empress #2 Mine	28-32-8-5	SE-SW-SE-SW-SW Sec. 8-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, concrete collar is caving, 4' X 4' wood-cribbing descends 12' to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
School House Mine	28-32-17-1	NW-NW-SE-NE-NE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 25' in diameter at surface, hole is water-filled and contains floating vegetation.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Luscombe Mine	28-32-17-2	NE-SW-NW-NE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' X 20' concrete collar is caving, trash and other debris is sloughing into hole.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Concord Mine (east shaft)	28-32- 17-4	W2-SE-SW-NE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and hidden by vegetation, 10' in dia- meter at surface, 3' X 5' wood-cribbing descends 20' to water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Concord Mine (west shaft)	28-32- 17-5	SE-SW-SW-NE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 25' in dia- meter at surface, 6' X 6' wood-cribbing descends 20' to water level, shaft is obscured by trash.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Charter Oak Mine (northeast shaft)	28-32- 17-10	C-S2-N2-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and hidden by vegetation, 25' in dia- meter at surface, sides are caving, 20' deep to water level	Steep, caving sides make fencing a temporary safe- guard; back-filling with nearby waste-rock is recommended.
Charter Oak Mine (east shaft)	28-32- 17-11	SE-SE-NW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is deterio- rating, 20' deep to water level, shaft contains trash and other debris.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Charter Oak Mine (southeast shaft)	28-32- 17-12	N2-NE-SW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is caving into hole which is 30' deep to a dry bottom.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Charter Oak Mine (southwest shaft)	28-32- 17-13	NW-NE-SW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 8' in dia- meter at surface, caving concrete collar, 5' X 5' wood-cribbing descends 10' to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Ealor Mining Company Mine	28-32-17-14	SE-NW-SW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled, 12' in diameter at surface, caving to a 5' X 5' hole.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Woods & Brown Mine	28-32-17-19	C-W2-E2-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 20' in diameter at surface, hole is water-filled.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
South Carterville Mining & Smelting Company Mine	28-32-17-21	SW-NE-SW-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 15' in diameter at surface, caving 12' down to water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
J.M.Slaight Mine	28-32-17-24	C-W2-NW-NW-SE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to the surface, 30' in diameter, sides are unstable.	Steep, caving sides make fencing a temporary safe-guard; back-filling with nearby waste-rock is recommended.
Beulah Mine	28-32-17-26	W2-NE-SE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 15' deep to a dry bottom.	Cyclone fencing and posting "DANGER" signs should provide reasonable safe-guards.
Duluth Mine	28-32-17-28	C-W2-NE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, forming a 20' X 30' stagnant pool, trash and debris in pool.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Center Creek Mining Company Mine (east workings-south shaft)	28-32-17-29	SE-NE-NE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 30' in diameter with unstable, collapsing sides.	Steep, caving sides make fencing a temporary safe-guard; back-filling with nearby waste-rock is recommended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Center Creek Mining Company Mine (east workings-northeast shaft)	28-32-17-32	SE-SE-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 4' X 4' wood-cribbing is visible below water.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Center Creek Mining Company Mine (east workings-northwest shaft)	28-32-17-33	SW-SE-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled to surface, 3' X 3' wood-cribbing is visible below water.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Ben Franklin Mine (south shaft)	28-32-17-36	SE-SW-NW-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' X 10' concrete collar is intact, 15' deep to trash fill.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Ben Franklin Mine (north shaft)	28-32-17-38	E2-NW-NW-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 40' in diameter at surface, caving 20' down to water level, 8'-diameter pool, Mississippian bedrock exposed in shaft walls.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Sunset Mine (west workings-south shaft)	28-32-17-39	SE-NW-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open within chat pile, 3' X 3' wood-cribbed hole is water-filled.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Sunset Mine (west workings-east shaft)	28-32-17-40	C-N2-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and producing an artesian flow, 20' in diameter at surface, sides are unstable.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Sunset Mine (west workings-central shaft)	28-32-17-41	NE-NW-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open within chat pile, 10' in diameter at surface, hole is water-filled.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Sunset Mine (west workings- northwest shaft)	28-32- 17-42	N2-N2-NW-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and produc- ing an artesian flow, 20' in diameter at surface, surge pool lies 40' south of shaft and is vegetated.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Sunset Mine (east workings- south shaft)	28-32- 17-43	NW-NE-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and is 8' in diameter at surface, hole is water-filled and con- tains floating vegetation.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Sunset Mine (east workings- central shaft)	28-32- 17-44	SW-SE-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, water- filled, 10' in diameter at surface, floating vegeta- tion in shaft.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Sunset Mine (east workings- north shaft)	28-32- 17-45	NW-SE-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' in dia- meter at surface, water- filled, hole contains floating vegetation.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Little Diamond Mine (southeast shaft)	28-32- 17-46	SW-NE-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 6' in dia- meter at surface and water-filled.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Little Diamond Mine (east shaft)	28-32- 17-47	C-NE-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water- filled, 6' in diameter at surface.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Little Diamond Mine (central shaft)	28-32- 17-48	W2-NE-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in dia- meter at surface, water- filled, sides are caving.	Steep, caving sides make fencing a temporary safe- guard; back-filling with nearby waste-rock is recommended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Little Diamond Mine (northwest shaft)	28-32- 17-49	NE-NW-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 8' in diameter at surface, water-filled, hole contains floating vegetation.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Little Diamond Mine (southwest shaft)	28-32- 17-50	SW-NW-NE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and 15' in diameter at surface, hole is water-filled.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Comet Mine (southeast shaft)	28-32- 17-51	C-S2-SE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving 10' down to the water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Comet Mine (northeast shaft)	28-32- 17-52	SW-NE-SE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 6' concrete collar is intact, 3' X 3' wood-cribbing also in good shape, 5' deep to water level.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Comet Mine (north shaft)	28-32- 17-53	SE-NW-SE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and water-filled, 3' X 4' wood-cribbing visible below water.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Comet Mine (south shaft)	28-32- 17-54	SW-SW-SE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' in diameter at surface, 8' deep to water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Comet Mine (central shaft)	28-32- 17-55	NW-SW-SE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 8' in diameter at surface, 8' deep to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Comet Mine (southwest shaft)	28-32- 17-58	C-S2-SW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving 8' down to a 5'-diameter pool at water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Comet Mine (west shaft)	28-32- 17-59	C-SW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 6' in diameter at surface and 6' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Comet Mine (northwest shaft)	28-32- 17-62	C-S2-NW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 12' in diameter at surface, 6' deep to water level, hole is about to coalesce with adjacent subsidence pit.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Twin Cities Mine	28-32- 17-65	SW-SE-NE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, 3' X 3' wood-cribbing is badly deteriorated, 20' deep to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Talisman Mine	28-32- 17-67	SW-SW-SE-NE-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 5' wood-cribbing is intact, 40' deep to a dry bottom, jeep and motorcycle trails immediately adjacent to opening.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Ramage Mine (southeast shaft)	28-32- 17-68	S2-NE-SW-NE-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' concrete collar is intact, some wood-cribbing remaining in shaft, 40' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Ramage Mine (northwest shaft)	28-32- 17-69	C-S2-S2-NW-NE-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, caving concrete collar, 4' X 6' wood-cribbing descends 25' down to water level.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Red Eagle Mine	28-32- 17-70	NE-NE-NE-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 40' in diameter at surface, caving 15' down to a 10'-diameter pool at water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Incline Mine	28-32- 17-72	C-E2-NW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving 25' down to a 5'-diameter pool at water level, shaft is about to coalesce with adjacent subsidence pit.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Daylight Mine	28-32- 17-75	C-E2-E2-W2-W2-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter at surface, caving 15' down to an 8'-diameter pool at water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Moark-Nemo Mine (northeast shaft)	28-32- 18-1	NE-NW-NE-NE-NE Sec. 18-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter at surface, caving concrete collar, sides are sloughing 20' down to a 5' X 7' rock-walled shaft, 100' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Moark-Nemo Mine (southwest shaft)	28-32- 18-2	E2-NE-NW-NE-NE Sec. 18-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving concrete collar, sides are sloughing 15' down to a 5' X 7' wood-cribbing which is deteriorating, 100' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
National #2 Mine	28-32-18-9	SW-NW-NE-SE-SE Sec. 18-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' X 5' concrete collar is intact, sides are caving below collar, 40' deep to water level, some wire-fencing surrounds shaft area at surface.	Boulder and chat piles in area should provide enough back-fill material; access to hazard is controlled due to private property.
Florine Mine	28-32-18-11	C-W2-NE-NE-NW Sec. 18-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving concrete collar, 15' deep to choked area of trash and debris, 6' X 6' rock-walled shaft descends 20' down to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Cornfield Mine (north shaft)	28-32-20-1	SE-NW-NW-NE-NE Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 20' deep to water level.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Cornfield Mine (south shaft)	28-32-20-2	NE-SW-NW-NE-NE Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, 20' deep to water level, 4' X 4' wood-cribbing visible at water level, sides are unstable.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Manhattan Mine	28-32-20-5	C-N2-S2-N2-S2 Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' in diameter at surface, caving 10' down to 3' X 3' wood-cribbing, 40' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Victor Mine (east shaft)	28-32- 20-6	W2-NE-NE-SE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' concrete collar and wood- cribbing are intact, 50' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Victor Mine (central shaft)	28-32- 20-8	W2-NW-NE-SE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' concrete collar and wood- cribbing are intact, 40' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Victor Mine (west shaft)	28-32- 20-10	N2-NE-NW-SE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 4' wood-cribbing is intact, 10' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Star Mine	28-32- 20-11	NE-SW-SE-NE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 5' wood-cribbing is intact, 40' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Gladys Mine	28-32- 20-13	N2-N2-NW-NW-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 15' in dia- meter at surface, caving concrete collar, 3' X 4' wood-cribbing is intact, 30' deep to a dry bottom.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Lucy Bell Mine (south shaft)	28-32- 20-14	NE-SW-SE-SW-NW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 15' in dia- meter at surface, 4' X 4' wood-cribbing is deterio- rating, 10' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Lucy Bell Mine (north shaft)	28-32- 20-15	SW-NW-SE-SW-NW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' rock-walled hole is 30' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Red Bird Mine	28-32 21-1	C-N2-SW-SE-NE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 10' in diameter at surface, rock-walled hole is 60' deep to a dry bottom, concrete foundations and trash are sloughing into opening.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Boston Get There Mine (Walker Shaft)	28-32- 21-2	N2-NE-SE-NE-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is caving into hole, 40' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Boston Get There Mine (Phoenix Shaft)	28-32- 21-3	C-W2-W2-SE-NE-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 5' wood-cribbing is intact, 30' deep to water level.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Boston Get There Mine (Atlas Shaft)	28-32- 21-4	C-W2-E2-SW-NE-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' wood-cribbing is collapsing into hole, 50' deep to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Boston Get There Mine (Wilgus Shaft)	28-32- 21-5	N2-SW-NW-NE-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, concrete foundations sloughing into hole, 40' deep to a dry bottom.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Noonday Mine (northeast shaft)	28-32- 21-6	NW-SW-SW-NE-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 12' in diameter at surface, sides are unstable, 60' deep to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Noonday Mine (southwest shaft)	28-32- 21-7	NW-NW-NW-NE-SW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is deteriorating, 25' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Gobbler Mine (southwest shaft)	28-32- 21-10	S2-SW-NE-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 40' deep to a dry bottom.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Gobbler Mine (northeast shaft)	28-32- 21-11	E2-SW-NE-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 40' deep to a dry bottom.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Twin City Mine (east shaft)	28-32- 21-13	E2-NE-NW-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 4' wood-cribbing is intact, 25' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Twin City Mine (west shaft)	28-32- 21-14	NW-NE-NW-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 50' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Eleventh Hour Mine (northeast shaft)	28-32- 21-15	W2-SW-NW-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 50' deep to water level.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Eleventh Hour Mine (southeast shaft)	28-32- 21-16	C-W2-W2-W2-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 15' deep to a dry bottom.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
Eleventh Hour Mine (southwest shaft)	28-32- 21-17	NE-NE-NE-SE-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is 20' in diameter at surface, caving 25' down to an unstable rock fill, 3' X 3' wood- cribbing is visible near fill.	Steep, caving sides make fencing a temporary safe- guard; back-filling with nearby waste-rock is recommended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Eleventh Hour Mine (northwest shaft)	28-32- 21-18	S2-SE-NE-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 70' deep to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Eleventh Hour Mine (west shaft)	28-32- 21-20	NW-NE-NW-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and hidden by vegetation, adjacent to MO-PAC railroad, 70' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Grasshopper Mine (northeast shaft)	28-32- 21-21	W2-SW-NE-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in dia- meter at surface, caving 25' down to 4' X 4' wood- cribbing, 75' deep to water level, hole is 15' south of MO-PAC railroad.	Fencing is inappropriate due to instability of sur- ficial material around shaft; boulder piles in area would provide good back-fill material.
Grasshopper Mine (northwest shaft)	28-32- 21-22	C-S2-N2-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 5' wood-cribbing is intact, 50' deep to a dry bottom, hole is 100' south of MO- PAC railroad.	Back-filling recommended; chat/boulder piles in the area would provide enough fill material and access is good for heavy, earth- moving machinery.
Grasshopper Mine (south shaft)	28-32- 21-23	SE-NW-SE-NE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, 30' deep to a dry bottom.	Fencing would be an inex- pensive, adequate safety measure; nearby chat piles could be used for fill material since access is good for heavy machinery and equipment.
Lucky Budge Mine	28-32- 21-25	C-NW-SW-SE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' wood-cribbing is intact, 30' deep to a dry bottom.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Dominion Mine	28-32- 21-26	S2-NE-NE-SW-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, hidden by thick brush and vegetation, 3' X 3' wood-cribbing is intact, 25' deep to a dry bottom.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Minnie May Mine	28-32- 21-27	N2-NE-NE-NW-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, collapsed at surface, 5' X 5' wood-cribbing is intact, 50' deep to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
McGregor Mine	28-32- 21-28	N2-NW-SW-NW-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 5' X 5' wood-cribbing is intact, 50' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Opal Wonder Mine (east shaft)	28-32- 21-29	C-E2-NW-NW-NW-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 5' wood-cribbing is intact, 40' deep to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Opal Wonder Mine (west shaft)	28-32- 21-30	SW-NW-NW-NW-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, concrete collar is intact, 3' X 3' wood-cribbing descends 30' down to the water level.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Gladstone Mine	28-32- 21-31	SW-NW-SE-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, adjacent to MO-PAC railroad, hole is 4' X 4' at surface, caving sides descend 20' down to the water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Unknown	28-32- 21-32	C-NW-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, 20' deep to water level, sides are unstable.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Unknown	28-32- 21-33	S2-NW-NW-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving sides, water-filled.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Continental Mine (west shaft)	28-32- 21-35	S2-SE-NE-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 15' in diameter at surface, water-filled.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Continental Mine (northwest shaft)	28-32- 21-37	N2-SW-NW-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 30' deep to water level, concrete foundations are caving into hole.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Continental Mine (southwest shaft)	28-32- 21-38	NE-SE-SE-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 3' X 3' wood-cribbing is intact, hole is water-filled.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Continental Mine (south shaft)	28-32- 21-39	SW-SW-SE-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, adjacent to large subsidence pit, hole is water-filled.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Continental Mine (central shaft)	28-32- 21-40	NW-SW-SE-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, adjacent to large subsidence pit, hole is water-filled.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Continental Mine (Steel Shaft)	28-32- 21-42	NE-SE-SE-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 50' deep to water level, some wire-fencing sur- rounds opening at surface.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Continental Mine (northeast shaft)	28-32- 21-43	S2-SW-NE-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 10' deep to water level.	Cyclone fencing and post- ing "DANGER" signs should provide reasonable safe- guards.
American Davies Mine	28-32- 21-44	N2-SW-SW-NE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' wood-cribbing is intact, 60' deep to a dry bottom, hole is hidden by vegeta- tion.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Cumberland Mine	28-32- 28-15	N2-NE-NW-NW Sec. 28-28N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 6' concrete collar is intact, 3' X 5' wood-cribbing de- scends 50' down to the water level, shaft is a USGS water gauging station, hazard is easily access- ible; only 200' south of well-travelled section line road.	Fencing could be easily installed around opening, concrete collar would be a good base for some type of seal or cap over the opening, back-filling material is also nearby.
Unity Mine	28-33- 1-1	NE-SW-NE-NE-SE Sec. 1-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in dia- meter at surface, water- filled, floating vegeta- tion in shaft.	Chat/boulder piles in the vicinity could be used for back-filling purposes.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
D. C. & E. Mine	28-33-1-2	E2-SE-SE-NE-SE Sec. 1-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' concrete collar is intact, hole is water-filled, shaft is easily accessible: only 50' west of well-travelled paved road.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
John L. Mine	28-33-12-1	E2-SE-SW-NE-NE Sec. 12-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, caving concrete collar, 50' deep to water level.	All mining waste (chats, boulders, concrete) in the area can be used for back-filling.
Herbert S. Mine (west shaft)	28-33-12-2	C-E2-NW-SE-NE Sec. 12-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 8' X 12' hole at surface, water-filled, boulders sloughing into shaft.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Herbert S. Mine (east shaft)	28-33-12-3	C-E2-W2-NE-SE-NE Sec. 12-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 50' in diameter at surface, 30' deep to rock-walled, 6' X 6' hole which is plugged with chat and boulders.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Wingfield Mine (northeast shaft)	28-33-12-4	C-N2-N2-SE-SE-NE Sec. 12-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 6' concrete collar and wood-cribbing are intact, 50' deep to water level, vegetation obscures shaft.	Back-fill materials are in the area; chain-link fencing and warning signs are also suggested.
Wingfield Mine (southwest shaft)	28-33-12-5	C-E2-SW-SE-NE Sec. 12-28N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter at surface, sides are unstable and descend 20' down to a trash fill which was burning at time of field visit.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Lucky Tiger Mine	29-32-8-3	C-W2-E2-SE-SE-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 60' in diameter at surface, sides are very unstable, descending 30' down to 3' X 3' wood-cribbing, 60' deep to water level, site is easily accessible and presently being used as local trash dump: only 75' west of well-travelled paved road.	Back-filling recommended; steep, caving sides make fencing a temporary safeguard.
Good Shepard Mine	29-32-8-5	NW-NW-SE-SW-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 15' in diameter at surface, hole is water-filled.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Big Kate Mine (northeast shaft)	29-32-8-7	C-E2-SE-SE-NW-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' concrete collar is intact, 15' deep to water level.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Big Kate Mine (northwest shaft)	29-32-8-8	SW-SE-SE-NW-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 6' in diameter at surface, wood-cribbing is deteriorated, 20' deep to water level.	Chat/boulder piles in the vicinity could be used for back-filling purposes.
Federated Lead & Zinc Company Mine	29-32-9-1	C-S2-SE-NE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 40' in diameter at surface, 15' deep to water level, sides are collapsing, hole is in the middle of a plowed field.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Trossack Mine	29-32-9-4	C-N2-N2-SW-SE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, water-filled.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Lewis & Company Mine	29-32-9-5	SE-NW-SW-NW-SE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 4' X 4' concrete collar is intact, hole is water-filled.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Texas Steer Mine	29-32-9-6	C-W2-W2-NW-SE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and producing an artesian flow, 4' X 4' concrete collar is intact.	Cyclone fencing and posting "DANGER" signs should provide reasonable safeguards.
Gore Mine (east shaft)	29-32-9-7	NE-SW-SE-NE-SW Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and producing an artesian flow, 4' X 4' concrete collar is intact, floating vegetation in shaft.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Gore Mine (west shaft)	29-32-9-8	NE-SE-SW-NE-SW Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and producing an artesian flow, 4' X 4' concrete collar is intact, floating vegetation in shaft.	All mining waste (chats, boulders, concrete) in area can be used for back-filling.
Good Wednesday Mine	29-32-15-1	W2-NE-NE-NE-NW Sec. 15-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open and producing an artesian flow, 6' in diameter at surface, floating vegetation in shaft.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Goodwill Mine (southeast shaft)	29-32-31-3	C-SE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad	Shaft is open, 12' X 12' concrete collar is caving, 6' X 6' rock-walled shaft descends 20' to water and debris.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
Goodwill Mine (northeast shaft)	29-32-31-4	S2-NE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, unstable sides caving down to 3' X 3' rock-walled hole, 20' deep to water level.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Goodwill Mine (central shaft)	29-32- 31-5	NW-SE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter at surface, unstable sides caving down to 4' X 4' rock-walled hole, 15' deep to water level.	Back-filling recommended: nearby chat/boulder piles can be used for fill material.
Goodwill Mine (northwest shaft)	29-32- 31-6	E2-NW-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 50' in diameter at surface, unstable sides caving down to 5' X 5' rock-walled hole, 30' deep to water level.	Ample fill material in the vicinity, good access for heavy, earth-moving machinery.
Goodwill Mine (west shaft)	29-32- 31-7	SE-NW-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 25' in diameter at surface, unstable sides caving down to 5' X 5' rock-walled hole, 25' deep to water level.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
La Tosca Mine (northeast shaft)	29-32- 31-8	SW-SE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, unstable sides caving down to 5' X 5' rock-walled hole, 20' deep to water level.	Chat/boulder piles in the area could be used for back-filling purposes.
La Tosca Mine (northwest shaft)	29-32- 31-10	C-E2-W2-E2-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 30' in diameter at surface, very unstable sides descend 25' to fill of junk and trash.	Steep, caving sides make fencing a temporary safeguard; back-filling with nearby waste-rock is recommended.
La Tosca Mine (east shaft)	29-32- 31-12	W2-SW-SW-NE-SW Sec. 31-29N.-32W. Webb City Quad	Shaft is open, 40' in diameter at surface, 12' deep to water level and trash.	Boulder and chat piles in area should provide enough fill material; access is good for heavy, earth-moving machinery.

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
La Tosca Mine (south shaft)	29-32- 31-13	C-S2-S2-S2-N2-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	Shaft is open, 20' in diameter at surface, unstable sides caving down to 3' X 3' wood-cribbing, 15' deep to water level and trash.	Back-filling recommended; nearby chat/boulder piles can be used for fill material.
Snapp-Gunning Mine	29-33- 23-1	C-W2-E2-NE-SE Sec. 23-29N.-33W. Webb City Quad Jasper Co., Mo.	Shaft is open, 25' in diameter at surface, hole is water-filled, located adjacent to concrete mill structures.	Boulder and chat piles in area should provide enough fill material; access to hazard is controlled due to private property.

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 12 Joplin West Quad Cherokee Co., Ks.	1	4107030N, 355735E	Buckeye Mine	Collapsed; 60 ft dia; 15 ft deep; dry; low hazard.	Filling
Do	2	4106265N, 356145E	Prospect	Collapsed; 20 ft dia; 15 ft deep; dry; low hazard.	do
Do	3	4105865N, 356140E	Cave Springs	5 ft x 5 ft; 10 ft deep; dry; low hazard.	do
Do	4	4105810N, 356180E	do	Collapsed; 30 ft dia; 20 ft deep; dry; moderate hazard.	do
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	1	4105775N, 356180E	Boston-Missouri Mining Co.	Collapsed; 50 ft dia; 25 ft deep; some trash; moderate hazard.	do
Do	2	4105780N, 356205E	do	25 ft dia at top; 8 ft dia below; 50 ft deep; dry; collapsed; high hazard.	Plugging
Do	3	4105720N, 356130E	Merchants Mining Co.	Collapsed; 25 ft dia at top; 6 ft dia at depth; 50 ft deep to water; high hazard.	do
Do	4	4105750N, 356070E	do	Collapsed; 15 ft dia at top; 17 ft dia below; 30 ft deep to water; high hazard.	do
Do	5	4105730N, 356075E	do	Collapsed; 18 ft dia at top; 6 ft dia below; 20 ft deep to water; high hazard.	do

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	6	4105720N, 356060E	Merchants Mining Co.	Collapsed; 10 ft dia at top; 6 ft dia below; 10 ft deep to water; high hazard.	Plugging
Do	7	4105710N, 356080E	do	Collapsed; 6 ft dia; 10 ft to water; high hazard.	do
Do	32	4104670N, 355590E	Connor Invest- ment Co.	Collapsed; 20 ft dia at top; 6 ft dia below; 30 ft deep; dry; high haz- ard.	do
Do	33	4104630N, 355550E	do	Collapsed; 30 ft dia at top; 6 ft dia below; 40 ft deep to water; high hazard.	do
Do	34	4104605N, 355590E	do	Collapsed; 25 ft dia at top; 6 ft dia below; 40 ft deep to water; high hazard.	do
Do	35	4104600N, 355605E	do	Collapsed; 20 ft dia at top; narrows to 6 ft dia; 40 ft deep to water; high hazard.	do
Do	36	4104575N, 355615E	do	Collapsed; 6 ft dia; 15 ft deep; dry; low hazard.	Filling
Do	37	4104570N, 355580E	do	Collapsed; 25 ft dia; narrows to 6 ft dia; dry; low hazard.	do

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	38	4104520N, 355555E	Connor Investment Co.	Partially collapsed; 6 ft dia; 50 ft deep to water; in high grass; very haz- ardous.	Plugging
Do	41	4104495N, 355655E	do	Collapsed; 20 ft dia; 15 ft deep; dry; moderate hazard.	Filling
Do	42	4104495N, 355760E	do	Collapsed; 20 ft dia; 30 ft to water; 20 ft to cribbing; high hazard.	Plugging
Do	43	4104445N, 355655E	do	Collapsed; 30 ft dia at top; narrows to 6 ft dia; 25 ft to water; moderate hazard.	do
Do	44	4104415N, 355670E	do	Collapsed; 20 ft dia at top; narrows to 6 ft dia; 15 ft deep to water; moderate hazard.	do
Do	45	4104405N, 355655E	do	Collapsed; 20 ft dia at top; narrows to 5 ft dia; 15 ft deep to water; moderate hazard.	do
Do	46	4104350N, 355615E	do	Collapsed; 20 ft dia at top; narrows to 4 ft dia; 15 ft deep to water; cribbed to 4 inches above water; moderate hazard.	do

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	47	4104345N, 355690E	Connor Investment Co.	Collapsed; 20 ft dia; 10- 15 ft deep; dry; low hazard.	Filling
T.34S., R.25E., Sec. 25 Joplin West Quad Cherokee Co., Ks.	1	4101015N, 355945E	Unknown	Collapsed; prospect shaft; 20 ft dia; 20 ft deep; dry; moderate hazard.	do

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 24 Carl Junction Quad Cherokee Co., Ks.	4	4123060N, 355875E	Grasselli No. 1 Mine	Collapsed; 40 ft dia; 20 ft deep; partly filled with large concrete blocks; moderate hazard.	Filling
Do	5	4122655N, 356400E	Butte-Kansas Mine	Collapsed; 40 ft dia; 15 ft deep; dry; low hazard.	do
Do	6	4122635N, 356375E	do	Collapsed; 30 ft dia; 10 ft deep; dry; low hazard.	do
Do	7	4122175N, 356280E	do	Collapsed; 50 ft dia; 25 ft deep; partly filled with trash; moderate hazard.	do
T.32S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	1	4122045N, 356365E	Acme No. 1 Mine	Collapsed; concrete slab falling in one side; 20 ft dia at top; 5 ft x 5 ft at top of shaft; 30 ft deep; dry; high haz- ard.	do
Do	2	4121635N, 356355E	Barnesdall No. 3 Mine	Collapsed; 25 ft dia at top; some cribbing left; large cottonwood over hole; depth-100 ft to water; high hazard.	Plugging or fencing.
Do	3	4121375N, 356355E	do	Collapsed; 60 ft dia; mostly filled with water; appears deep; high haz- ard.	Fencing

Table A-1 - OPEN MINE SHAFTS, ADITS, AND PITS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	4	4121250N, 356385E	Unknown	Partly collapsed; 9 ft x 12 ft slab in place; depth-100 ft to water; no protection; high hazard.	Capping or plugging.
Do	5	4121640N, 356260E	Barnesdall No. 3 Mine	Uncollapsed; 4 ft x 4 ft; 30 ft to water; hole partially covered by oak tree trunk.	Plugging
Do	6	4120910N, 355910E	Unknown	Collapsed; 15 ft dia; 50 ft to water; in trees; fenced; high hazard.	do
T.33S., R.25E., Sec. 13 Carl Junction Quad Cherokee Co., Ks.	2	4114230N, 355840E	Cincinnati Mine	Collapsed; 25 ft dia; 10-15 ft deep; dry; low hazard.	Filling
Do	3	4114150N, 355830E	do	Collapsed; 25 ft dia; 10-15 ft deep; partially filled with trash; low hazard.	do
Do	4	4114070N, 355790E	do	Collapsed; 25 ft dia; 10-15 ft deep; dry; low hazard.	do
T.33S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	1	4112115N, 356195E	Chicago Mine	Collapsed; 30 ft dia; 15 ft deep; trees and concrete filling hole; low hazard.	do
Do	2	4112100N, 356145E	do	Collapsed; 20 ft dia; 10 ft deep; in trees; low hazard.	do

Table A-1 - OPEN MINE SHAFTS - Continued

Name	Site #	Location	Present Condition	Suggested Remedial Action
Wolfheart Mine	27-32-3-5	NE-NW-SW-SE-NW Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, shallow pool overlies opening, barbed wire fencing encloses area.	Site is on private land and access is controlled.
St. Regis Mine	27-32-3-6	SW-NW-SE-NE-SW Sec. 3-27N.-32W. Joplin East Quad Jasper Co., Mo.	Shaft is open, 30' deep to water level, wood-cribbing is collapsing into shaft; hole measures 4' x 6', barb-wire fencing surrounds shaft, limited access to area as trucking firm uses the grounds.	Shaft appears to be closing itself as the cribbing is about to collapse. Ample chat in the area for back-filling purposes.
Gabriel Mine	27-32-4-1	W2-NW-NW-NE-NE Sec. 4-27N.-32W. Joplin East Quad Jasper Co., Mo.	Water-filled prospect pit lies only 30' south of paved section-line road; pit is steep-sided, used for dumping junk, and is filled with 15' of water. Diameter at top of pit is 20'.	Wire-fencing around this pit would be a temporary solution. Filling would be quite easy. Good access for a bulldozer and ample fill material adjacent to pit.
Henckel Mine (south shaft)	27-32-24-1	SW-NE-NE-SW-SW Sec. 24-27N.-32W. Joplin East Quad Newton Co., Mo.	Shaft, back-filled to within 20 ft. of the surface, collapsed around surface to 15 ft. in diameter; west end of this pit is an overhang due to a concrete slab that extends out over the pit; pit is somewhat camouflaged due to thick brush around the edge of the pit and trees growing out of the bottom of the pit.	There appears to be enough fill material in the immediate area to fill this pit. Other concrete remains from mining operations 200 ft. northeast of this pit could also be used.

Table A-2 - SUBSIDENCE EVENTS

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
27-32-4-2	C-W2-E2-E2-NE-SE Sec. 4-27N.-32W. Joplin East Quad Jasper Co., Mo.	pre-1938	This site overlies M. & B. Mine; water-filled open pit measures 200' x 100' with estimated water depth about 40'; located near well-travelled road, easily accessible to public. Large amount of chats in this area as well as boulder-rock piles; all could be used for fill. Pit could be graded and/or drained. Grading and fill would be a solution.
27-32-10-1	C-N2-N2-NW-NW Sec. 10-27N.-32W. Joplin East Quad Jasper Co., Mo.	pre-1938	This site overlies Baltic Mine; water-filled pit, 150' in diameter, adjacent to old U.S.-66. Back-fill material lies adjacent to this pit and would provide the best solution for this hazard.
27-33-11-1	SE-SW-NW-NE-SE Sec. 11-27N.-33W. Joplin East Quad Jasper Co., Mo.	early 1970's	This site overlies Yellowstone Mine; shaft was originally 130' deep. A Joplin city engineer reported a subsidence in the area above this mine; no evidence was found at time of field check. City street location: 15th St. & Kansas Ave., NE corner of intersection, side yard at north side of private residence.
27-33-12-1	C-E2-NW-SW Sec. 12-27N.-33W. Joplin East Quad Jasper Co., Mo.	early 1970's	This site overlies New Emmet Mine; shaft was originally 170' deep. At Murphy Blvd. & 15th St., 1st Community Church had foundation problems during construction. They had planned to build a multi-story structure, but it was determined that the ground was sinking after the 1st story was built. The basement also suffered severe cracking and settling.
28-32-28-9	SW-NW-SW Sec. 28-28N.-32W. Joplin East Quad Jasper Co., Mo.	pre-1938	This site overlies C. & D. Mine; open pit with deep water; pit is irregular shaped, approximately 200' long in SW-NE direction, 75' across, and 30' deep to water level. Ample chat piles surround pit and could be pushed in for fill material. Trenching a ravine through a slope of the pit and out into an undeveloped field may solve the problem of deep water.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32- 29-4	C-W2-NE-SW-SE-NE Sec. 29-28N.-32W. Joplin East Quad Jasper Co., Mo.	pre-1938	This site overlies Tom C. #4 Mine; large open pit, generally circular, about 150' diameter, 30' deep to water level, slopes are not steep. Some concrete foundations are located due west of the above hazard and are not too stable in the ground. The concrete foundations should be knocked down and/or removed as they are in a state of collapse. The water-filled open pit could be drained into the dry open pit via ditches and ravines. The numerous chat piles and boulders could be levelled/graded into and around the pit.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
27-33- 2-1	S2-SW-NE-SE-SW Sec. 2-27N.-33W. Joplin West Quad Jasper Co., Mo.	early 1982	This site overlies Swindle Hill Mine; the Joplin city engineer reported a 30' deep subsidence occurred in the southbound lane of Murphy Blvd. between 5th & 6th Sts. The hole was filled and patched.
27-33- 2-2	S2-S2-SE-SW Sec. 2-27N.-33W. Joplin West Quad Jasper Co., Mo.	1970-present	This site overlies Zola Mine; 7th St. bridge over Joplin Creek and railroads is slowly sinking on the north side. This is probably in part due to mined areas below. The site is being monitored for amount of movement by Mo. Hwy. Dept.
27-33- 4-2	W2-NW-SE-NE Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	pre-1938	This site overlies Bullfrog Mine; open pit, 160' diameter, 25' to water level, bedrock exposed along steep sides of subsidence. Tailings pond, chat piles and boulders in the area.
27-33- 4-5	C-E2-E2-W2-NW-NW Sec. 4-27N.-33W. Joplin West Quad Jasper Co., Mo.	pre-1938	This site overlies Baltimore Mine; subsidence is 120' diameter, 60+' deep, 20' deep to water level, steep sides. Bedrock near water level on west side. Chat piles and foundations remain.
27-33- 5-1	SW-SE-SW-SW Sec. 5-27N.-33W. Joplin West Quad Jasper Co., Mo.	1940-present	This site overlies West 7th Street Mine; Mo. Hwy. Dept. reported major highway failures at this site due to the caving mine workings below. Large scale repairs were carried out in the years 1981, 1963 and throughout the 1940's.
27-33- 9-1	NW-NW-NW-SE-SE Sec. 9-27N.-33W. Joplin West Quad Jasper Co., Mo.	1980	This site does not directly overlie any known mine working; however, numerous shafts and mines are nearby. A 40' diameter hole opened in an unpaved parking lot at the KODE (radio) baseball park. The hole was filled with trash, dirt, and gravel.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
27-33-14-1	SW-SE-NW-SW-SW Sec. 14-27N.-33W. Joplin West Quad Jasper Co., Mo.	late 1970's	This site lies in an area of numerous prospects and shafts, but does not directly overlie any known mine; the Joplin city engineer reported a curb section of 30th St. (south side), between Pennsylvania & Virginia Sts., had to be filled and patched due to a small subsidence.
27-33-15-1	E2-SE-NW-SW Sec. 15-27N.-33W. Joplin West Quad Jasper Co., Mo.	1981	This site overlies Anne Baxter Mine; a subsidence occurred during October 1981 at the Ozark Health Center in Joplin. A hole, 15' in diameter and 30' in depth, opened in the asphalt-paved parking area. A sewer line was exposed near the base of the hole. The area is underlain by mine drifts at depths of 55' and 75'. Additional sinking at this spot was observed during March and June 1982. Drilling program now underway to detail the underground cavities.
27-33-15-2	E2-W2-W2-SW Sec. 15-27N.-33W. Joplin West Quad Jasper Co., Mo.	1960-present	This site overlies Eagle South Mine; many small subsidences in this hospital area complex. Drilling program now underway to detail hazardous underground cavities that may prove dangerous to future construction.
27-33-15-3	W2-E2-NW-SW Sec. 15-27N.-33W. Joplin West Quad Jasper Co., Mo.	1982	This site overlies Eagle North Mine; many small subsidences in this hospital area complex. A major subsidence occurred in the hospital parking lot during early June 1982. The resultant hole was 60' deep, water-filled to within 20' of the surface. Surface outline was oval-shaped, 10' x 20'. Drilling program is now underway to detail underground cavities that may prove dangerous to future construction.
27-33-16-1	SW-SE-SE-SE-SE Sec. 16-27N.-33W. Joplin West Quad Jasper Co., Mo.	late 1970's	This site overlies pre-1900 mine workings of the Empire Zinc Co. A 20' diameter hole, located on the west side of the intersection of Maiden Ln. and 32nd St., was patched by the city.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
27-33-19-1	C-E2-E2-SE-SE-NE Sec. 19-27N.-33W. Joplin West Quad Newton Co., Mo.	pre-1938	This site overlies Black Jack West Mine; large subsidence pit is 60' in diameter, 25' deep, quite dry, sides are steep and collapsing; junk, tires and trash are being dumped in the pit. A large amount of material would have to be dumped into the pit to back-fill it. Area is unstable and probably would continue to subside. Controlled access and danger signs would be a preliminary measure.
27-33-20-1	C-W2-W2-NE-NE-SE Sec. 20-27N.-33W. Joplin West Quad Newton Co., Mo.	post-1938 pre-1961	This site overlies Hutchinson Mine; elongate pit measures 40' x 100' and 30' deep to water level, very steep and collapsing sides. Two well-travelled roads are adjacent to this pit - high priority hazard! Suggest hauling in numerous loads of fill material to close the pit.
27-33-20-5	C-W2-W2-SW-SW-NW Sec. 20-27N.-33W. Joplin West Quad Newton Co., Mo.	pre-1938	This site overlies Black Jack East Mine; large subsidence pit is roughly 80' in diameter and 30' in depth, some deep water pools at the bottom of the south and east ends of pit, lots of tires and rubbish accumulating quickly in the pit. Entire area is unstable; thus, back-filling would probably be futile. Access is limited due to private property so fencing and danger signs would be effective safeguards temporarily.
27-34-2-2	W2-SE-NW-SW-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	pre-1938	This site overlies Kramer Mine; south pit is 30' deep to a dry bottom, steep-sided, caving and fenced with barbed wire. This pit will probably join the north pit by gradually collapsing the road that lies between them. Area is controlled by Farmer's Chemical Co. and hopefully they can limit access into this area.
27-34-2-3	N2-SW-NW-SW-NE Sec. 2-27N.-34W. Joplin West Quad Jasper Co., Mo.	pre-1938	This site overlies Kramer Mine; north pit is water-filled to within 50' of surface, steep-sided, caving and fenced with barbed wire. This pit will probably join the south pit by gradually collapsing the road that lies between them. Area is controlled by Farmer's Chemical Co. and hopefully they can limit access into this area.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
27-34- 24-8	C-E2-SW-NE-SW Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	pre-1938	This site overlies Gimlet Mine; northwest subsidence pit is 30' in diameter, steep-sided and water-filled. Access is controlled to this area due to private property; however, ample chats are available for back-fill material. Posting danger signs would also be a good safeguard.
27-34- 24-11	C-S2-S2-NE-SE Sec. 24-27N.-34W. Joplin West Quad Newton Co., Mo.	pre-1938	This site overlies Gimlet Mine; southeast subsidence pit is elongate - 40' x 15' - with steep sides and deep water. Access is controlled to this area due to private property; however, ample chats are available for back-fill material. Posting danger signs would also be a good safeguard.
28-33- 33-7	C-NW-SW-SE-NW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies McBride Mine; subsidence pit is 100' in diameter, water-filled. Boulders, chat piles and concrete foundations remain in area.
28-33- 33-10	SE-SE-NE-SW-NW Sec. 33-28N.-33W. Joplin West Quad Jasper Co., Mo.	mid 1970's	This site does not directly overlie any known mine working, but large mines and numerous shafts are nearby. A 4' diameter hole in the center of Schifferdecker Rd. was patched by the city.
28-34- 25-1	S2-NE-SE-SE-SW Sec. 25-28N.-34W. Joplin West Quad Jasper Co., Mo.	pre-1938	This site overlies Midnight Mine; large oval-shaped sink-hole with steep sides measures 200' x 100' x 80' deep. Actual mine is at bottom of sinkhole on the NW end; mine is water-filled. Posting of danger signs would alert hikers and other unsuspecting people; rim of sinkhole could also be fenced although only the west end is hidden by the chat piles.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-33-7-7	C-W2-W2-E2 Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Bryant Mine; subsidence pit is 60' x 80', has steep sides, and is 15' deep to the water level.
28-33-7-9	W2-NW-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Great Northern Mine; subsidence pit is 100' in diameter, has steep sides, and is 10' deep to the water level. Chat and boulder piles remain in the area.
28-33-7-10	NW-SW-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies United Zinc Mine, north pit; subsided area is 40' in diameter and 10' deep to the water level. Chat piles and concrete foundations remain in the area.
28-33-7-12	SW-SW-NW-NW-SE Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies United Zinc Mine, south pit; subsided area is 40' in diameter and 10' deep to the water level. Chat piles and concrete foundations remain in the area.
28-33-7-17	W2-NW-NE-SE-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Lehigh Mine, east pit; subsided area is 30' in diameter and 5' deep to the water level.
28-33-7-20	C-W2-SW Sec. 7-28N.-33W. Carl Junction Quad Jasper Co., Mo.		This site is not a subsidence, it is the Lehigh Mine - an open pit, water-filled, covering 10 acres; its sides are steep in most places. This area is frequented by local youths as a swimming/fishing hole. Site is easily accessible.
28-33-16-1	C-S2-SW-SE-SE Sec. 16-28N.-33W. Carl Junction Quad Jasper Co., Mo.		This site is not a subsidence, it is an unstable chat pile which overlies the Pocahontas Mine. Area is easily accessible via playgrounds and subdivision only 200' away. Some shallow pools of water also in the area.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-33-17-1	C-W2-E2-SW-NE-NW Sec. 17-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Waneta Pearl Mine; subsidence pit is 25' in diameter and water-filled. Concrete foundations, chat and boulder piles remain in the area.
28-33-17-3	SE-SE-NW-SE-NW Sec. 17-28N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Texas Bull Mine; subsidence pit is 75' in diameter with bedrock exposed, approximately 15' deep. Owner reports that it is usually dry. Chat and boulder piles remain.
28-33-19-1	NE-NE Sec. 19-28N.-33W. Carl Junction Quad Jasper Co., Mo.		This site is not a subsidence, it is the Kelsey Norman Mine - an open pit, water-filled, covering 11 acres; its sides are steep and cut into ravines; some thin coal seams were mined here as well as zinc and lead. Area seems to be a popular swimming/fishing hole in addition to being a junk and trash dumping site. Area is easily accessible.
28-34-11-1	NW-NE-NW-NE-NE Sec. 11-28N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Black Cat Mine; subsidence pit is 100' x 150', water level is at 15'. Pit is presently being used as a trash dump; approximately 30 cubic yards of trash are visible. Chats are removed and field is agriculturally productive.
28-34-11-2	NW-NW-NE-NW-NE Sec. 11-28N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Martin #2 Mine; subsidence pit is 200' in diameter with water level at 15'. Land is agriculturally productive.
28-34-12-1	SW-NE-NW-SW-NW Sec. 12-28N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Isherwood Mine, northeast pit; subsidence is 200' x 100' and water-filled; area is agriculturally productive.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-34-12-3	C-S2-NW-SW-NW Sec. 12-28N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Isherwood Mine, southwest pit; subsided area measures 200' x 150' and is water-filled; agriculturally productive area.
28-34-12-4	SE-NW-NW-SW-NW Sec. 12-28N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Isherwood Mine, northwest pit; subsidence is 125' x 50' and water-filled; land in this area is agriculturally productive.
29-33-18-3	NW-NW-NE-SE-SE Sec. 18-29N.-33W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Indiana Mine; subsidence pit is 50' in diameter, 15' deep to water level.
29-34-14-3	SW-SW-SW-SW-SE Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Allegheny-Western Mine, north pit; subsided area is 60' in diameter, water-filled. Boulders remain.
29-34-14-4	E2-SE-NE-SE-SW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Blue Rock Mine, east pit; subsided area is 200' x 100', water-filled. Boulders remain.
29-34-14-6	SW-NE-SE-SW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Blue Rock Mine, west pit; subsided area is 100' in diameter, water-filled. Boulders remain.
29-34-14-7	C-N2-SE-SW-SE-NW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Gascho Mine; subsidence pit is 200' x 100', water 15' below surface. Water flowing into coalescing open shaft to north.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-34-14-11	C-W2-W2-SW-SW Sec. 14-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Freehold #2 Mine; subsidence pit is 120', 10' to water level.
29-34-15-2	NE-SE-SE-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies High Five Mine, east pit; subsided area is 50' in diameter, water-filled.
29-34-15-4	SE-SE-SE-SE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies High Five Mine, southeast pit; subsided area is 60' in diameter, water-filled. Tailings ponds and boulder piles are present in the area.
29-34-15-5	NE-SE-SW-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies High Five Mine, southwest pit; subsided area is 50' in diameter, water-filled.
29-34-15-7	NE-NE-SW-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies High Five Mine, central pit; subsided area is 100' in diameter, water-filled, coalesced with shaft and concrete foundations.
29-34-15-8	C-E2-W2-NW-NE-SE Sec. 15-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies High Five Mine, northwest pit; subsided area is 100' x 300', water 25' below surface, coalesced with 2 shafts and concrete foundations.
29-34-22-3	W2-SE-NW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Barnsdall #2 Mine, northwest pit; subsided area is 100' x 300', water 20' below surface, filled with junk and debris.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-34-22-5	C-N2-NE-SW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Barnsdall #2 Mine, north-central pit; subsided area is 100' in diameter, water 15' below surface, filled with junk and debris.
29-34-22-6	NE-SE-SW-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Barnsdall #2 Mine, south-central pit; subsided area is 80' in diameter, water 20' below surface, filled with junk and debris.
29-34-22-8	C-S2-SE-NE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Goodyear Mine, north pit; subsided area is 70' in diameter, dry, 20' deep adjacent to NE open shaft.
29-34-22-10	C-E2-NE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Goodyear Mine, east pit; subsided area is 150' x 200', 15' deep to water level.
29-34-22-11	SE-SE-NE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Goodyear Mine, southeast pit; subsided area is 50' in diameter, 15' deep to water level.
29-34-22-13	NE-NW-SE-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Goodyear Mine, southwest pit; subsided area is 100' x 150', 20' deep to water level.
29-34-22-15	C-SE-NW-SE-NE Sec. 22-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Barnsdall #2 Mine, southwest pit; subsided area is 120' in diameter, water 20' below surface, filled with junk and debris.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-34- 23-2	NW-NW-NE-NW-NE Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1961 pre-1980	This site overlies Pyramid Mine; subsidence pit is 50' in diameter, water-filled. Boulders, chat flats and concrete foundations remain.
29-34- 23-4	C-NE-NW-NW-NE Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Allegheny-Western Mine, south pit; subsided area is 150' in diameter, water-filled. Boulders, chat flats and concrete foundations remain.
29-34- 23-7	SW-NE-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Freehold #3 Mine, east pit; subsided area is 120' in diameter, water-filled. Concrete foundations, chat flats and boulders remain.
29-34- 23-9	C-NW-NE-NE-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Freehold #3 Mine, west pit; subsided area is 50' in diameter, water-filled. Concrete foundations, chat flats and boulders remain.
29-34- 23-14	NE-NE-SE-SW-NW Sec. 23-29N.-34W. Carl Junction Quad Jasper Co., Mo.	pre-1938	This site overlies Tulsa-Pittsburg #1 Mine; subsidence pit is 60' in diameter, 15' deep to water level. Boulders and chat flats remain.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-6-5	C-W2-E2-W2-SE-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Yellow Dog Mine; subsidence pit is 40' in diameter, 30' deep, with steep, caving sides.
28-32-6-16	W2-NW-SW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Parker Mine; subsided area measures 400' X 700' and is water-filled, with several open shafts having coalesced near its perimeter.
28-32-6-24	S2-SW-SE-SW-NW Sec. 6-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Richvale Mine; subsidence pit is water-filled, 180' in diameter, with steep, unstable slopes.
28-32-7-6	W2-NE-NW-SE-SW Sec. 7-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Mercantile #4 Mine; subsided area is 80' in diameter, 25' deep to water pool, adjacent to STL-FRISCO railroad, pirates wet-weather stream entering area from the south.
28-32-17-3	C-N2-SW-NE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Luscombe Mine; subsided area is 100' X 300', 40' deep to a muddy bottom, adjacent to gravel roads and trash dumps.
28-32-17-6	NW-NE-NW-SE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Fullerton Mine, east pit; subsidence is 150' in diameter and water-filled.
28-32-17-7	C-NW-NW-SE-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Fullerton Mine, west pit; subsided area measures 200' in diameter and is water-filled.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-17-8	C-SW-SE-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Great Wonder Mine; subsided area is 100' in diameter and water-filled.
28-32-17-9	NE-SE-NW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Charter Oak Mine; subsidence is 60' in diameter, trash and debris partially filling pit, located within 50' of private residences in the city of Cartersville.
28-32-17-15	W2-SW-SW-NW-SE Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Ealor Mining Company Mine; subsidence pit is 60' in diameter, water-filled, and located in a densely vegetated area.
28-32-17-16	E2-SW-SE-SE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	post-1980	This site does not directly overlie any known mine working, but large mines and numerous shafts are nearby; subsided area is 15' in diameter, water-filled, and located in an open field adjacent to paved highway.
28-32-17-17	SE-NW-NE-SE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Brick Mill Mine; subsidence pit is 200' in diameter, 50' deep to water level, with steep, unstable sides.
28-32-17-18	E2-NW-SE-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Woods & Brown Mine, south pit; subsidence measures 100' X 400', water-filled, with unstable slopes, trash dumps located near north end of pit.
28-32-17-20	C-S2-N2-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Woods & Brown Mine, north pit; subsided area is 100' X 200' and water-filled, trash dumps are located nearby.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-17-22	SE-SW-NW-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	post-1961 pre-1980	This site overlies South Carterville Mining & Smelting Company Mine; subsidence pit is 80' X 200' and water-filled.
28-32-17-23	SW-SW-NE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Pawnee Mine; subsided area is 80' X 150', 15' deep to water pool, with unstable sides.
28-32-17-25	E2-SW-NW-SE-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies J. M. Slaughter Mine; subsidence pit is 100' X 200', 15' deep to water pool, with unstable slopes.
28-32-17-27	C-S2-NE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Duluth Mine; subsided area is 50' in diameter, 20' deep to water level.
28-32-17-30	C-NE-NE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, east workings, south pit; subsidence pit is 100' X 150' and 20' deep to water level.
28-32-17-31	N2-NW-NE-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, east workings, west pit; subsided area measures 100' X 150', 20' deep to water pool, with unstable sides.
28-32-17-34	W2-SE-SE-NW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, east workings, north pit; subsidence is 80' X 100', 20' deep to water level, with caving sides.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-17-35	E2-NE-NW-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Ben Franklin Mine, east pit; subsidence is 200' X 300', 30' deep to water pool, located adjacent to MO-PAC railroad.
28-32-17-37	C-N2-NW-SW-SW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Ben Franklin Mine, west pit; subsided area measures 100' X 200', 30' deep to water level.
28-32-17-56	E2-SE-SW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Comet Mine, southeast pit; subsidence is 150' X 200', 20' deep to water level, located adjacent to MO-PAC railroad.
28-32-17-57	SE-SW-SW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Comet Mine, southwest pit; subsided area is 50' X 100', 25' deep to water pool, with unstable sides.
28-32-17-60	C-S2-N2-SW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Comet Mine, west pit; subsidence pit is 50' X 100', 20' deep to water level, with caving slopes.
28-32-17-61	W2-SE-NW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Comet Mine, northwest pit; subsided area measures 50' in diameter, 20' deep to water level, located adjacent to MO-PAC railroad.
28-32-17-63	NE-NW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, north workings, northeast pit; subsidence is 150' in diameter, 20' deep to water level, connected to other subsidences in adjacent section.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-17-64	W2-NW-SW-SE-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Twin Cities Mine; subsided area is 250' in diameter, 30' deep to water level, with very unstable sides. located near residences in the city of Carterville.
28-32-17-66	S2-NW-SE-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Orange Mine; subsidence pit measures 400' X 500', 30' deep to water level, with steep, caving sides, located near residences in the city of Carterville.
28-32-17-71	C-E2-E2-W2-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Red Eagle Mine; subsidence is 80' in diameter, water-filled, pirates stream entering area from the south, pit is located adjacent to MO-PAC railroad.
28-32-17-73	NE-NW-SW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Incline Mine; subsided area measures 300' in diameter, 30' deep to water pool, with unstable sides, located adjacent to MO-PAC railroad.
28-32-17-74	SW-SE-NW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Daylight Mine, east pit; subsidence is 300' X 400', 25' deep to water level, with very unstable sides, located adjacent to MO-PAC railroad and used by local residents for swimming and fishing.
28-32-17-76	N2-SE-SW-NW-NW Sec. 17-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Daylight Mine, west pit; subsided area is 50' X 70', 20' deep to water pool.
28-32-18-3	SE-NE-SE-SE-NE Sec. 18-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, north workings, north pit; subsidence is 200' in diameter, water-filled, with steep, caving slopes visible below water, connected to several adjacent pits during high-water periods.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-18-4	NW-SE-SE-SE-NE Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, north workings, northwest pit; subsidence is 200' in diameter, 20' deep to water pool, with unstable slopes, connected to other pits during times of high water levels.
28-32-18-5	C-E2-E2-E2 Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, north workings, southwest pit; subsided area is 120' in diameter, 20' deep to water level.
28-32-18-6	S2-NE-NE-NE-SE Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, north workings, south pit; subsidence is 150' in diameter, 20' deep to water pool, with steep, caving sides.
28-32-18-7	E2-NE-SE-NE-SE Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Center Creek Mining Company Mine, south workings; subsided area is 100' X 200', 20' deep to water level, trash dump located at north end of pit.
28-32-18-8	E2-NE-NE-SE-SE Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies National #2 Mine; subsidence is 100' in diameter, 30' deep to a dry bottom, adjacent to a spur of the MO-PAC railroad.
28-32-18-10	S2-SW-SE-SW-SE Sec. 18-28N.,-32W. Webb City Quad Jasper Co., Mo.	1981	This site does not directly overlie any known mine working, but large mines and numerous shafts are nearby; a 2'-diameter hole, 6' in depth, opened in the paved parking lot of Mr. Swiss restaurant; hole was filled and patched with asphalt.
28-32-19-1	S2-NW-NE Sec. 19-28N.,-32W. Webb City Quad Jasper Co., Mo.		This site is not a subsidence, it is the Sucker Flats Mine - a large open pit, water-filled to within 50' of the surface, measuring 400' X 800' and covering 5 acres, with very steep slopes, located just south of the city of Webb City.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-20-3	C-S2 Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Manhattan Mine, south pit; subsided area measures 100' X 150', 50' deep to muddy bottom, small adit near base of pit in north wall, sides are steep and unstable.
28-32-20-4	C-S2-N2-S2 Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Manhattan Mine, north pit; subsidence is 100' X 200', 40' deep to a dry bottom, with unstable slopes.
28-32-20-7	C-E2-E2-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Victor Mine, east pit; subsidence is 300' in diameter, 50' deep to a dry bottom, with steep, unstable, sides.
28-32-20-9	SW-SW-SE-NE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Victor Mine, west pit; subsided area is 200' in diameter, 40' to a dry bottom, with caving sides.
28-32-20-12	NE-NE-SW-NE-SW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Star Mine; subsidence pit is 100' in diameter and 25' deep to a dry bottom.
28-32-20-16	C-E2-NW-SW-NW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Dickey Mine; subsidence pit measures 100' X 300' and is water-filled, located adjacent to MO-PAC railroad.
28-32-20-17	N2-SW-SW-NW-NW Sec. 20-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Yale Mine; subsided area is 100' X 300', 30' deep to a dry bottom, abundant trash dumps in the immediate vicinity.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32-21-8	NE-SW-SE-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Noonday Mine, south pit; subsided area is 80' in diameter, 20' deep to a dry bottom, pit contains trash and debris.
28-32-21-9	SE-NW-SE-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Noonday Mine, north pit; subsidence is 80' in diameter with steep sides, 20' deep to a dry bottom, junk and trash in pit.
28-32-21-12	SE-NW-NW-SE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Eleventh Hour Mine, east workings; subsided area measures 200' X 400', 80' deep to a dry bottom, with unstable slopes.
28-32-21-19	C-S2-N2-N2-S2 Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Eleventh Hour Mine, west workings; subsidence pit is 200' in diameter and 60' deep to a dry bottom.
28-32-21-24	NW-SE-SW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Holy Smoke Mine; subsided area includes two pits, covering 4 acres, measuring 400' X 600', 30' deep to water level, with very unstable slopes, abundant trash dumps in and around pits.
28-32-21-34	E2-SE-NW-SW-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Richland Mine; subsidence is 60' in diameter and water-filled.
28-32-21-36	NW-SW-NW-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Continental Mine, north pit; subsided area measures 50' X 100' and 30' deep to a dry bottom.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
28-32- 21-41	W2-SW-SE-SE-NW Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Continental Mine, south pit; subsidence is 150' X 300', water-filled, with steep sides visible below the water.
28-32- 21-45	NW-NE Sec. 21-28N.-32W. Webb City Quad Jasper Co., Mo.		This site overlies American Davies Mine; a large roof-fall occurred in this area during mining operations; no surface evidence of this collapse is visible on aerial photos and field investigation disclosed no features relating to ground subsidence.
28-32- 29-6	SE-NW-NE-NE-NW Sec. 29-28N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Lima Mine; subsidence pit is 40' X 200', 25' deep to water pool, metal rubbish dumped into pit, located 200' south of well-travelled section-line road.
29-32- 8-1	N2-SE-SW-NE Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Express Mine; subsided area measures 200' X 600', 50' deep to water level, with steep sides.
29-32- 8-2	N2-NE-SW-SW-NE Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Lone Star Mine; subsidence is 150' X 300', 60' deep to water pool, Pennsylvanian shales and sandstones exposed in sides of pit.
29-32- 8-4	E2-W2-SE-SE-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Lucky Tiger Mine; subsided area is 80' X 200' and used as a local trash dump, no water in pit.
29-32- 8-6	SE-SE-SE-NW-NW Sec. 8-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Big Kate Mine; subsidence pit measures 100' in diameter, 20' deep to water level, with steep, unstable slopes.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-32-9-2	S2-NE-SE-SE-SE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Edwina Mine; subsidence is 30' X 70', 20' deep to water level, with unstable sides.
29-32-9-3	W2-SE-SW-SE Sec. 9-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Happy Jack Mine; subsided area measures 100' X 200' and is 20' deep to water level.
29-32-10-1	C-W2-SW-SW-SW Sec. 10-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Isabella Mine; subsidence is 150' in diameter and 25' deep to water pool.
29-32-15-2	S2-NW-NE-NE-NW Sec. 15-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Good Wednesday Mine; subsidence pit is 150' in diameter, water-filled, with steep, caving sides visible below the water.
29-32-15-3	W2-NW-NW-NE-NW Sec. 15-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Federated Mine; subsided area measures 100' X 150' and is water-filled.
29-32-16-1	NW-SW-NE-NE-NE Sec. 16-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Good Friday Mine; subsidence is 150' X 200' and 30' deep to water level.
29-32-16-2	N2-SW-NW-NE-NE Sec. 16-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Jersey P. Mine; subsidence pit is 100' in diameter, 25' deep to water level, abundant trash dumps in immediate vicinity.

Table A-2 - SUBSIDENCE EVENTS - Continued.

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-32-16-3	NE-NE-NE-NW-NE Sec. 16-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Montclair Mine; subsided area is 120' in diameter and 15' deep to water level.
29-32-16-4	SE-NW-SE-SE Sec. 16-29N.-32W. Webb City Quad Jasper Co., Mo.		This site is not a subsidence, it is the Old West Side Mine - an open pit covering 3 acres and measuring 300' in diameter, 40' deep to water level, with unstable sides composed of Pennsylvanian strata.
29-32-31-1	SE-SE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies Goodwill Mine, south pit; subsidence is 80' X 120', 30' deep to a dry bottom, much trash and metal rubbish in pit.
29-32-31-2	E2-SE-NE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies Goodwill Mine, north pit; subsided area is 60' in diameter, 30' deep to a dry bottom, much trash and metal rubbish in pit.
29-32-31-9	C-W2-E2-E2-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies La Tosca Mine, northeast pit; subsidence is 50' in diameter, 40' deep to water pool, with very steep, unstable sides, Pennsylvanian strata exposed in walls of pit.
29-32-31-11	NE-NW-SE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	post-1938 pre-1961	This site overlies La Tosca Mine, northwest pit; subsidence is 80' in diameter, 50' deep to a fill of boulders and metal rubbish, Pennsylvanian shales and sandstones exposed in the caving sides of pit.
29-32-31-14	NW-SE-SE-NW-SW Sec. 31-29N.-32W. Webb City Quad Jasper Co., Mo.	pre-1938	This site overlies La Tosca Mine, south pit; subsided area is 100' X 200', 40' deep to water level, large amount of trash and debris in pit.

Table A-2 - SUBSIDENCE EVENTS - Continued

Site #	Location	Date of Subsidence	Damages Involved/Present Condition
29-33- 23-2	E2-NW-SE Sec. 23-29N.-33W. Webb City Quad Jasper Co., Mo.		This site is not a subsidence, it is the Snapp-Gunning Mine - an open pit covering 5 acres and measuring 400' in diameter, 40' deep to water pool, some Pennsylvanian bedrock exposed in sides of pit, access to area is controlled due to private property, reported depth of pit is 150'.
29-33 36-1	E2-NE-SE Sec. 36-29N.-33W. Webb City Quad Jasper Co., Mo.		This site is not a subsidence, it is the Oronogo Circle Mine, a famous open pit covering 11 acres and measuring 800' in diameter, 60' deep to water pool, with very steep, unstable sides, pit is used for swimming, fishing, and scuba-diving, access to area is not controlled, reported depth of pit is 300'.

Table A-2 - SUBSIDENCE EVENTS - Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 12 Joplin West Quad Cherokee Co., Ks.	1	4107065N, 355700E	pre-1938	60 x 120 ft; 20 ft deep; dry; may not be due to collapse; some waste material nearby.	None
Do	2	4106330N, 355660E	do	200 ft dia; 30 ft deep; water at bottom; partly water-filled; partial chat pile to north.	Fencing
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	21	4104745N, 355600E	pre-1950	50 ft dia; 10 ft deep; dry; shallow; low hazard.	None
Do	22	4104775N, 355625E	do	100 ft dia; 10 ft deep; dry; shallow; low hazard.	do
Do	23	4104765N, 355655E	do	80 ft dia; 10-15 ft deep; dry; shallow; some trash.	do
Do	24	4104740N, 355625E	do	50 ft dia; 10 ft deep; dry; shallow; low hazard.	do
Do	25	4104660N, 355720E	do	90 ft dia; 10-15 ft deep; dry; shallow; low hazard.	do
Do	26	4104625N, 355775E	do	90 ft dia; 10-15 ft deep; dry; shallow; low hazard.	do
Do	27	4104600N, 355795E	do	50 ft dia; 5-10 ft deep; dry; shallow; low hazard.	do
Do	28	4104570N, 355810E	do	130 x 60 ft; 5-10 ft deep; dry; shallow; low hazard.	do

Table A-2 - SUBSIDENCE EVENTS - Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	29	4104600N, 355735E	pre-1950	60 ft dia; 5 ft deep; dry; shallow; low hazard.	None
Do	30	4104550N, 355670E	do	40 ft dia; 10 ft deep; dry; shallow; low hazard.	do
Do	31	4104520N, 355685E	do	60 x 100 ft; 10-15 ft deep; shallow; low hazard.	do
Do	32	4104370N, 355625E	pre-1938	100 ft dia; water at 15 ft deep; partly water- filled; moderate hazard.	do

Table A-2 - SUBSIDENCE EVENTS - Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 24 Carl Junction Quad Cherokee Co., Ks.	3	4123250N, 355880E	1938-1950	150 ft dia; 20 ft deep; collapsed shaft on west side; flooded to 15 ft of surface; shaft not visi- ble when flooded; high hazard.	Fencing
Do	4	4123120N, 355890E	pre-1938	200 ft dia; 20 ft deep; dry-mud bottom; low hazard.	do
Do	5	4123050N, 355920E	do	50 ft dia; 15 ft deep; dry; low hazard.	do
Do	6	4122760N, 356160E	do	220 ft dia; 35 ft deep; mud bottom; moderate hazard.	do
Do	7	4122790N, 356280E	do	200 ft dia; 35 ft deep; mostly dry; holds water on photos; moderate haz- ard.	do
Do	8	4122740N, 356410E	do	200 x 450 ft; 30 ft deep; chat in bottom; low to moderate hazard.	do
Do	9	4122660N, 356280E	do	400 x 200 ft; 40 ft deep; dry; moderate hazard.	do
Do	10	4122560N, 356390E	do	450 x 200 ft; 20 ft deep; collapsing piers on northeast side near Stateline Road; low haz- ard.	Fencing; warning signs.

Table A-2 - SUBSIDENCE EVENTS - Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 24 Carl Junction Quad Cherokee Co., Ks.	11	4122400N, 356460E	pre-1938	200 x 400 ft; 30 ft deep; some water in bottom; along Stateline Road.	Fencing; warning signs.
T.32S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	1	4122040N, 356270E	1938-1950	200 ft dia; 25 ft deep; dry; chat in bottom; slight hazard.	None
Do	2	4122050N, 356400E	do	100 x 150 ft; 40 ft deep; dry; piers collapsing on northwest side; slight hazard.	do
Do	3	4121990N, 356360E	pre-1938	175 x 250 ft; 40 ft deep; water-mud bottom with car bodies; moderate hazard.	Fencing
Do	4	4121850N, 356350E	do	250 ft dia; 35 ft deep; water bottom; moderate hazard.	do
Do	5	4121660N, 356450E	west end: 1938-1950 east end: pre-1938	400 x 250 ft; 35 ft deep; chat bottom; moderate haz- ard.	do
Do	6	4121560N, 356370E	1950-1973	160 ft dia; 35 ft deep; chat bottom; slight haz- ard.	do
Do	7	4121550N, 356220E	do	160 x 220 ft; 15 ft deep; chat-water bottom; slight hazard.	None

Table A-2 - SUBSIDENCE EVENTS - Continued

Location	Site Number	UTM Coordinates Zone 15	Date of Subsidence	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	8	4121450N, 356375E	1938-1950	Small; 22 ft dia; 5 ft deep; dry; low hazard.	None
Do	9	4121430N, 356375E	do	10 ft dia; 5 ft deep; dry; low hazard.	do
Do	10	4121410N, 356380E	do	20 ft dia; 5 ft deep; dry; low hazard.	do
Do	11	4121335N, 356410E	1950-1973	50 ft dia; shallow depth; water-filled to within 3 ft of surface; moderate hazard.	Fencing
Do	12	4121275N, 356440E	pre-1938	250 ft dia; 40 ft deep; dry; used for trash dumping, especially along west side of Stateline Road.	Warning signs along road; fencing
Do	13	4121215N, 356470E	do	90 ft dia; 30 ft deep; dry; trash dump along east side of Stateline Road.	Warning signs; fencing.
T.33S., R.25E., Sec. 13 Carl Junction Quad Cherokee Co., Ks.	1	4114190N, 355830E	do	220 x 60 ft; 6 ft to water; near railroad track.	Fencing
Do	2	4114060N, 355760E	do	50 x 90 ft; 10-15 ft deep; just west of shaft; some water in bottom with trees and trash; low hazard.	None

Table A-3 - CHAT PILES AND TAILINGS PONDS

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.34S., R.25E., Sec. 12 Joplin West Quad Cherokee Co., Ks.	1	4106950N, 355800E	Buckeye Mine	Chat pile-180 ft dia; 25 ft high; partially reclaimed.	Reclamation
Do	2	4106450N, 355750E	Unknown	Chat pile-250 x 130 ft on hillside; variable height.	do
T.34S., R.25E., Sec. 13 Joplin West Quad Cherokee Co., Ks.	8	4105600N, 356175E	Merchants Mining Co.	Chat pile-150 ft dia; 20-30 ft high; par- tially reclaimed on northeast side.	Reclamation or use for shaft filling.
Do	27	4104525N, 355750E	Connor Invest- ment Co.	Chat pile-250 ft dia; 20 ft high; partially reclaimed on east side.	do
Do	28	4104300N, 355650E	do	Chat pile-200 x 180 ft; partially re- claimed on south side.	do

Table A-3 - CHAT PILES AND TAILINGS PONDS - Continued

Location	Site Number	UTM Coordinates Zone 15	Name	Size and Present Condition	Suggested Remedial Action
T.32S., R.25E., Sec. 24 Carl Junction Quad Cherokee Co., Ks.	1	4123000N, 356000E	Grasselli No. 1 Mine	Old tailings pond embankments are breached; area-5.2 acres; drains into surface collapse on west side; susceptible to wind erosion.	Revegetation
Do	2	4122400N, 355900E	High Five Land	Old tailings pond area covers 9 acres; embankments breached; dry; possible air pollution; some run- off into tributary of Cow Creek.	do
Do	3	4122400N, 356200E	Butte-Kansas	Low chat pile; 20 ft high; 300 ft dam.	Reclamation - use to fill some nearby hazards.
T.32S., R.25E., Sec. 25 Carl Junction Quad Cherokee Co., Ks.	4	4121400N, 356000E	Hurlbut-Acme No. 2	Old tailings pond; dry; area-15 acres; run-off may reach tributary of Cow Creek; possible wind erosion.	Revegetation